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MENTAL HEALTH PROBLEMS IN SCHOOL CHILDREN *

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In the early part of 1922 I made a brief survey [1] of a special school in Philadelphia. It was my impression after this study that organized neuropsychiatric examination of regular schoolchildren was essential and would be of great value to teachers, parents, school officials and most important of all to the pupils themselves. Suggestions were made in my report for the organization of a traveling clinic, and a central clinic controlled by the Board of Education which should be in close cooperation and association with the various neuropsychiatric clinics in the city. The need for providing children's psychopathic wards was also emphasized. It was shown in this study that the examination and treatment of preschool children, and school children in the regular classes showing behavior disorders, would obviate the necessity of placing many such children in the special classes. When plans were made for the study reported in this paper the following aims were kept in mind. First, the children should represent an unselected group referred by the teachers from one school district. The First School District (West Philadelphia) was chosen. Second, the first fifty children of this type should be examined in a routine way and should be followed over a period of at least one year and preferably longer. Third, the data of these examinations should be conveniently arranged into the following heads: (1) reason referred by teacher; (2) examination findings, physical, mental and psychometric; (3) the situation data. Rôle of environmental factors; (4) formulation of corrective modification in the treatment of each case, and (5) therapeutic results obtained at conclusion of study.

* Received for publication, June 17, 1924.

* From the Neuropsychiatric Clinic, Philadelphia General Hospital. Presented before the combined meeting of the Philadelphia Psychiatric and Pediatric Societies May 13, 1924.

1. Ebaugh, F. G.: The Use of a Travelling Clinic in a Scheme for the Neuropsychiatric Examination of School Children, Month. Bull. Dept. Pub. Health, Philadelphia, August, 1922; Mental Hygiene **7**:365 (April) 1923.

It was hoped that the data gathered in a study of such a group of children might emphasize the need of neuropsychiatric examination, and help to formulate a definite method of approach to the vital public health problem involved. The studies of Richards [2] and others have been of great value in this regard. The fact that these cases represent average and unselected material referred by the teachers may serve to give an idea of the general conditions to be dealt with in the neuropsychiatric examination of schoolchildren.

In the group, the age and school grade are shown in Table 1. It will be noted that some children are of kindergarten age as in Case 34 (Table 2).

The reasons for sending the children to the clinic varied from inability to learn to all types of delinquencies, including lying, stealing, truancy and vagrancy. Nervousness, temper tantrums, spells and outbreaks of various types were often the immediate reasons given by the teacher referring the pupils. In many cases the teacher had excellent

TABLE 1.—*Age, Number and School Grade of Children*

Age	Number of Pupils	School Grade
15	2	1 6-A, 1 4-A
14	9	1 Jr. High, 2 8-A, 3 6-A, 2 5-A, 1 OB.
13	6	1 7-B, 2 5-A, 1 4-B, 2 3-A
12	6	1 7-B, 1 6-B, 1 5-A, 1 4-B, 2 4-A
11	4	1 6-B, 1 6-A, 1 4-B, 1 3-A
10	5	1 4-A, 1 3-B, 1 3-A, 1 OB, 1 6-A
9	4	1 4-B, 2 2-A, 1 4-A
8	5	1 2-B, 1 2-A, 2 1-B, 1 1-A
7	4	3 1-B, 1 1-A
6	4	1 1-B, 3 1-A
4	1	Kindergarten

insight into the poor physical condition of the child and realized that it might have entered into his school difficulties. Cases 6, 14, 16 and 17 were referred because of definite complaints of headaches, dizziness and vomiting. Case 17 was found to be typical adiposogenital dystrophy.

The examination findings in the group can be commented on from three viewpoints. First, physical; second, mental and third, psychometric.

The physical findings were of great interest and played a definite rôle in approximately half of these cases. For instance, marked undernutrition, often with a pronounced residual of rickets, was present in fifteen cases. A tonsillectomy and adenoidectomy were recommended in fourteen cases. Dental caries played a rôle in many cases. One child (Case 40) when examined in the clinic had a temperature of 103,

2. Richards, Esther L.: Some Adaptive Difficulties Found in School Children, Mental Hygiene **4**:331 (April) 1920; The Rôle of Situation in Psychopathological Conditions, ibid. **5**:449 (July) 1921; The Elementary School and the Individual Child, ibid. **5**:707 (Oct.) 1921; The Significance and Management of Hypochondriacal Trends in Children, ibid. **7**:43 (Jan.) 1923.

pulse of 160, with a typical diphtheretic membrane over the tonsils. Prompt admission to the ward and immediate antitoxin treatment led to an uneventful recovery. Another boy (Case 27) showed typical findings of acute epidemic encephalitis, with the characteristic onset of headaches, dizziness, diplopia and agitative insomnia. A year later no sequelae of the disease was present, except a tendency toward reversal of the sleep curve so common in this condition. This boy was advised to remain away from school for a period of one year, since we felt very strongly that many unfortunate sequelae might be prevented if convalescence is prolonged over this period of time.

In two patients (Cases 19 and 25) congenital syphilis was present. One of these children had been receiving antisyphilitic treatment regularly and had shown progressive improvement, with a complete cessation of delinquent tendencies. The other child unfortunately reported irregularly, and was finally sent to the Municipal Court in an attempt to coerce him to receive regular treatment in a nearby clinic. Each of these children had negative spinal fluids.

Three patients with endocrine dysfunctioning (Cases 2, 17 and 26) were found, chiefly of the hypopituitary, Frölich's syndrome type. Treatment with pituitary extract resulted in transient relief of the headaches with no noteworthy improvement in school. Roentgen-ray examination of the sella turcica was reported normal in each case.

Visual defects were infrequent and had to be especially considered in only three patients (Cases 8, 30 and 48). Suspicious pulmonary signs were present in one case. Evidence of cardiac disease was found in three children, who were later referred to the Heart Clinic for treatment. Generalized lymph adenopathy was present in one case, the cause of which was not determined. Phimosis was marked in three patients, Cases 42, 44 and 50. We cannot emphasize the importance of these physical findings and their close association to the pupil's maladjustment. For instance, the association of undernutrition with emotional instability, as described by Brown,[3] was noted in this group. These findings indicate that in any neuropsychiatric examination a thorough and complete physical examination must be performed. All the resources of internal medicine and the specialists are often required, not only for diagnosis but also for treatment. No mental clinic can be complete without these facilities.

The mental findings may be discussed with the situation data, in that they represent a definite relationship and are considered as a reaction to the home or school. In the history of these cases we found neurotic traits present, such as bedwetting, night terrors, capriciousness

3. Brown, Sanger: The Mental and Physical Health of Schoolchildren, J. A. M. A. **80**:135 (May 12) 1923.

TABLE 2.—*Data of the School Children*

Case	Sex*	Reason Referred by Teacher	Physical Examination	Situational Data	Corrective Modifications	Therapeutic Results, May, 1924
1..... Colored Aged 15 years 6th grade	♂	Very insolent, indifferent to school work; repeated first, fourth, fifth, sixth grades	Mouth breather; systolic murmur at apex; left nasal passage almost occluded by adenoid tissue; tonsils removed; expansion of chest diminished; pigeon breast; under-developed; attitude in clinic suspicious; states all the trouble is with the teacher; intelligence quotient, 75; manual ability excellent; lacked interest in tests	Mother belligerent, uncooperative; declares emphatically that the boy is normal, that the trouble is with teachers; child evidently reflects her attitude	Improve physical conditions; remove adenoids; change parental attitude; teach boy along manual lines; begin vocation	Excellent adjustment; patient working in bootblack shop; is self-supporting; likes work better than school; physical condition improved; better parental attitude
2..... ..... White Aged 11 years	♂	Disobedient; has threatened violence; stated he would kill a boy in school, etc.	Suggestive endocrine disturbance of hypothyroid type, in his tendency to obesity (dry, rough skin, coarse hair, etc.); intelligence quotient, 88	Little training at home; father alcoholic, abuses mother; marked domestic frictions; child fights with brothers and sisters; continues to sleep with mother	Careful social service treatment regarding home situation; change in environment; stimulate Boy Scout activities; send to summer camp; remove sources of infection; endocrine treatment	At first improvement; endocrine therapy of much value; tonsillectomy and adenoidectomy performed; attended summer camp and was much improved; after return to home influence he relapsed to former condition; now worse
3..... Colored Aged 11 years	♂	Immediate reason for referring to clinic, steals, hits teacher	Negative physical examination; pediculosis; intelligence quotient, 79.5	Father and mother both deserted patient; grandfather, 78 years of age, tries to take care of patient; "goat of the gang"	Change to better sourroundings; vocational training	No change; home conditions not improved; now being handled by court
4..... White Aged 14 years 5-A grade	♀	Vulgar in school; dwells on sex matters	Many preoccupations concerning sex topics; when she worries about these topics, becomes dizzy, has headaches; at other times feels depressed and must go to church; mental conflict with over-compensation; intelligence quotient, 53	Instrumental delivery; never has been considered normal; infantile paralysis at age of 3; has always been emotional; has mute periods for several hours	Train along lines of special ability to enable patient to be self-supporting; transient institutional treatment may be advisable for this plan; give facts to desensitize her concerning sex interests	Sex habits improved; given more responsibility at home; intelligence quotient unreliable owing to affective trends present
5..... Aged 6 years 1st grade	♂	Retardation in school.....	Mental retardation for two years; bitemporal diameters of head increased	The parents feel the school difficulties are teacher's fault, and that the patient is normal in every way; mother does not speak English; refused to cooperate further	Case closed owing to relatives' refusal to allow psychologic examination and to have boy return to clinic	Case closed owing to relatives' refusal to allow psychologic examination and to have boy return to clinic
6..... White Aged 6 years	♂	Headaches and dizziness complained of for last half year; no behavior oddities; sometimes headaches are accompanied by vomiting	Well nourished; tonsils infected; has adenoids; rapid heart; roentgenogram of sella turcica normal; roentgenograms show patient has no frontal sinusitis; ethmoid and antra are normal; normal mental examination; apparently well adjusted at school and at home	See report of Case 22, patient's brother	Careful study regarding origin of headaches; do they represent migrain attacks; referred to pediatricians	Improved physically; progressing normally in school

7..... White Aged 6 years 4th grade	♂	Wilful, stubborn, hard to train	Slight under-nutrition; demanded constant attention from mother in clinic	Temper tantrums during early infancy; dominates situation at home; always has his own way; still must be reminded to go to toilet; chiefly on "irregular candy diet"; over-indulgent mother	Careful habit training to include re-education of parents; ignore temper tantrums; increase contact with boys his age; summer camp to affect change of environment; not to sleep with mother	Re-education of parents proceeded slowly; sent to summer camp; habit training has resulted in readjustment
8..... White Aged 6 years 1-B grade	♂	Overactive mentally and physically; will not "stay put" in class room	Roentgen-ray examination of head negative; deficient attention; marked irritability; visual defect; over-talkative in clinic; intelligence quotient, 100	Had an accident in May, 1921, struck head on concrete after falling down front steps, physician diagnosed concussion; spoiled in school as well as dominating situation at home; temper tantrums before accident	Careful eye examination; clinic psychologic teaching; more supervision at home	Marked improvement; parents cooperated well and showed excellent insight concerning the boy's problem
9..... White Aged 13 years 7-B grade	♂	Poor school record; three years ago work began to deteriorate	Marked under-nutrition and under-development; visceroptosis; marked emotional instability; intelligence quotient, 83	Three years ago family suffered severely from poverty; all children were under-nourished; child became listless, seemed to lack comprehension; convulsions since age of 2, following teething; numerous acute infections and diseases; convulsions stopped after an attack of influenza in 1917	Careful gastro-intestinal study; proper dietetic routine; rest in country; stimulate to learn some definite vocation	Visited; family has moved to New Jersey; condition improved
10..... White Aged 9 years 1-B grade	♂	Stammering, very excitable; inability to progress in school	Physicial examination negative; inquisitive and imaginative; intense dislike and fear of colored children; intelligence quotient, 98.8	Drinks quantities of cocoa and coffee; a bed-wetter; sleeps poorly, dreams about wolves, horses, cows, etc.	Institutional care to establish training; better dietetic routine; desensitize concerning fears	Adjusting well; enuresis has practically disappeared
11..... White Aged 13 years 3d grade	♂	Stealing and running away from home; on one occasion stole $20 from his teacher	Feels he is abused at home; over-suggestible; planned to go West with $20 and work in a gold mine; intelligence quotient, 93	Beaten severely by father, who has been very harsh with patient; convulsions since age of 5	Change of environment; better supervision	Placed in church school by court, to remain until 21; likes new home
12..... White Aged 13 years 5th grade	♂	Restless in school; nervous and stubborn	Marked under-nutrition; suspicious pulmonary signs; patient is restless, irritable and emotional	Many changes in residence and schools; night terrors, and spends all time reading	Improve physical condition by better eating and sleeping arrangements; increase of interests and activities, such as is offered by Boy Scouts, etc.	Excellent adjustment; normal physically; passing in all school subjects; in sixth grade; on school swimming team
13..... White Aged 7 years 1st grade	♂	Backward in school.....	Marked under-nutrition; all work is done slowly, mentally and physically; quality of work good; intelligence quotient, 96	Congenital cardiac disease; occasional fainting attacks	Improve physical conditions; place in restoration class, where he will receive more individual attention	No improvement; attending heart clinic
14..... White Aged 8 years 2d grade	♂	Complained of headaches and stomach trouble	Marked under-nutrition; weight, 43½ pounds; residuals of rickets present; enlarged tonsils and adenoids; lacks vitality and initiative; intelligence quotient, 87	At 4 years had operation to straighten legs, in casts for 16 weeks; very much spoiled; capricious about food; fussy; developed many complaints, "headaches and stomach trouble" being main ones	Immediate tonsil and adenoid operation; careful dietetic routine; avoid spoiling; place on own resources	Advice regarding diet being followed; boy gaining in weight; tonsillectomy and adenoidectomy performed; does well in school work
15..... Colored Aged 15 years 3d grade	♂	Wanders away from home, lies and steals; plays like a child 2 years old; cannot learn in school	Well developed and well nourished; good work with performance test; intelligent quotient, 60	Three failures in third grade	Individual training; transfer to high-grade feebleminded institution; manual training advised owing to performance ability	No improvement

TABLE 2.—*Data of the School Children—Continued*

Case	Sex*	Reason Referred by Teacher	Physical Examination	Situational Data	Corrective Modifications	Therapeutic Results, May, 1924
16..... Aged 14 years	..	Dizzy spells following attack of jaundice; extremely nervous	Good physical condition; no evidence of infection found	Attack of jaundice, December, 1922, affecting four members of family; main symptoms were dizziness, intense jaundice, pains in arms and legs	Referred to pediatric clinic.....	Getting along better in school; now in 6th-B grade; conduct good
17..... Colored Aged 11 years 6-A grade	♂	Over weight and gradual decline in school ability; frequent headaches	Endocrine disturbance of hypopituitary type; weight, 192 pounds; height, 5 feet 1 inch; roentgen-ray examination of sella turcica normal; intelligence quotient, 85	No significance	Given pituitary extract and small doses of thyroid with relief of headaches	Little improvement
18..... Colored Aged 14 years 5-A grade	♂	Truancy and indifference to school work	Chronic tonsillitis; oral sepsis; cardiac hypertrophy; mitral stenosis; no abnormal mental trends; intelligence quotient, 74.8	Mother dead; child neglected at home	Treatment of underlying physical condition	Reported to heart clinic; later sent to correctional institution before arrangements were made for tonsillectomy
19..... Colored Aged 8 years 1-B grade	♂	Erratic behavior; stubborn, impulsive and continually quarreling in school	Blood Wassermann, 4 plus; very defiant, emotional, depressed; intelligence quotient, 91	Parents separated; mother has been treated for tuberculosis and syphilis and still under treatment in N. P. Clinic; taken care of by foster mother	Admitted to ward for spinal fluid examination which was negative; give intensive antisyphilitic therapy	No improvement; sent to court, to start regular antisyphilitic treatment
20..... White Aged 10 years 3d grade	♂	Nervous; poor school work, repeated second grade three times; very capricious appetite	Excellent performance ability; speech defect; bright, active child; likes to discuss his nervousness; intelligence quotient, 88	Onset of present trouble with change of residence from rural environment to city two years ago; over-indulged by mother to extent of being given food at 2 a. m.; does not associate with boys because they are too rough; when nervous, must sleep with mother, etc.	Careful habit training at home regarding eating and sleeping arrangements; encouragement to join in with groups; fixed routine for disciplinne	Little improvement; now treated by family physician; in 4th grade
21..... White Aged 16 years 4th grade	♀	School on account of stealing during last year; inability to progress in school	Enlarged cryptic tonsils; acneform skin condition; foreign birth and surroundings may have influenced intelligence quotient; mental conflict present over auto-eroticism; intelligence quotient, 60	Discontent with change of residence to different section of city; inability to make friends; upset by instinctive practice; worry over menstruation; few interests	Tonsil and adenoid operation; athletic interests; increased contact; re-education concerning sex ideas; appropriate vocation	Adjusting; working regularly in department store; sublimation of sex interests; unable to adjust and progress in school
22..... White Aged 12 years 4-A grade	♂	Frequent temper outbursts; constant trouble to teachers	Slight under-nutrition; good development; attitude superior; evasive and does not discuss problems frankly; intelligence quotient, 81	At 6 months held his breath when crossed; idol of mother whom he had always dominated and who shields patient from father, who has bad temper; cowardly; incontinency of urine during temper tantrums; capricious regarding food	Re-education of mother regarding measures for training and management and correct dietetic routine	Gradual improvement in proportion to degree of success in re-education of parents; now in 5th grade

23..... White Aged 14 years	♀	Two months previous began to be indifferent in school; played truant; frequent outbursts of temper; failing in all subjects; recently ran away to New York	Hypertrophied tonsils, mitral stenosis; very reticent regarding problems; extremely listless; intelligence quotient, 115	Jealous of older sister; over-attachment to father; emotionally upset by attempted assault just previous to onset of truancy and school difficulties	Careful psychiatric social service study of home situation leading to stimulation of interests; tonsillectomy advised	Adjusting well after leaving school; interested in many activities; likes continuation school
24..... Colored Aged 9 years 2d grade	♂	Immoral tendencies; uses vile language and exposes himself	Tonsils enlarged; sinus arrhythmia; mental conflict probably present; intelligence quotient, 100	Mother works during day; older sisters and brothers have court records; constant study of lewd topics received from nearby riding academy	Change in environment; conversion of interests to normal channels through careful habit training, encouragement, proper example, etc.	No improvement; home conditions bad
25..... White Aged 7 years 1-B grade	♀	A truant; cannot learn; steals; wanders away from school	Typical findings of congenital syphilis; blood Wassermann 4 plus; emotional; prevaricates freely; at times mute; spinal fluid negative; intelligence quotient, 87.8	Mistreated by father and stepsister; never received any discipline; now taken care of by aunt	Continue antisyphilitic treatment	Marked improvement; receiving treatment regularly; no further delinquency
26..... White Aged 14 years 6th grade	♂	Incorrigible	General under-nutrition and under-development; suggestive endocrine disturbance; underdeveloped genitalia; roentgenray examination of sella turcica, smaller than normal; intelligence quotient, 87	Family poverty stricken; parents unable to discipline patient	Improve physical condition; glandular extract (pituitary extract) administered; vocational training along lines of special abilities	Adjusting better
27..... White Aged 14 years Junior High	♂	Referred by private physician	Double vision; drowsiness; pains in arms and chest; nocturnal agitations, etc.; typical acute epidemic encephalitis	Of no significance.....	Prompt admission to hospital	No behavior sequelae; reversal of sleep curve; advised not to return to school for one year (working part time)
28..... White Aged 8 years 1st grade	♀	Backward in school.....	Marked under-nutrition; residuals of rickets; visual defects; intelligence quotient, 80	Poor general health; two attacks of appendicitis; frequent tonsillitis	Appendectomy advised, as well as tonsillectomy and adenoidectomy operation; refraction advised	No improvement; refuses to wear glasses; home conditions bad
29..... White Aged 9 years 2d grade	♀	Repetition of school grade	Physical examination negative; reaction slow; little initiative; training below normal; intelligence quotient, 82	Normal birth; weaned; at 4 months weighed only 8 pounds; difficult problem of artificial feeding	Referred to pediatrician, who had previously arranged for tonsil and adenoid operation; not to be stimulated beyond her ability	Later report; child improving in school work; continues in outside physician's care
30..... White Aged 10 years 4th grade	♀	Has spells resembling epilepsy	Enlarged tonsils; intelligence quotient, 91.9	Mother has depressive psychosismanic phase; patient said to laugh a great deal and talk excitedly; has had several attacks said to resemble epilepsy; restless at night; now in 4th grade with no failure	Avoid discussion of mother's condition and nagging at home; ignore attacks; avoid excessive stimulation, etc.; tonsillectomy; eye examination	Excellent adjustment, both at home and at school; spells have disappeared; has glasses
31..... White Aged 14 years	♂	Nervousness in school; inability to concentrate causing failure	Excellent performance ability; showed marked emotional instability; main preoccupation centers about his mother, who deserted him during infancy; intelligence quotient, 88	Mother alcoholic, living with paramour; patient sees her once a month; patient very much interested in urchins, to whom he is very kind; associates this kindness with feeling of neglect from his own parents; worry over sex topics; smoking excessively	Desensitize concerning parental situation; stimulate special interests and vocational attitudes; given facts concerning smoking habit; re-educate about sex topics	Patient has obtained papers for continuation school; is working and adjusting well

TABLE 2.—*Data of the School Children—Continued*

Case	Sex*	Reason Referred by Teacher	Physical Examination	Situational Data	Corrective Modifications	Therapeutic Results, May, 1924
32..... White Aged 12 years 4-B grade	♂	Truancy and disorderly conduct	Normal physically; normal mentally	Mother dead; patient taken care of by father; no home training; uses tobacco	Careful psychiatric social service study in which father was advised to show more interest in child and his problems, Boy Scout activities, etc.; change of environment suggested	Poor progress; refused to return to clinic; later unfortunately sent to Reform School
33..... White Aged 9 years 4-B grade	♂	Poor school progress; lack of energy	Under-nourished; normal mentality; basal age, 10 years	Father had nervous breakdown, loses temper quickly and punishes patient severely; grandmothers have spoiled patient and interfere with mother's discipline; patient sleeps in grandmother's room; refuses to eat certain foods; buys cake and candy to satisfy hunger	Place in restoration class; improve physical condition; change environmental conditions by careful psychiatric social service suggestions	Father's and grandmother's attitude have changed and they are improving home situation; attended boys' camp; adjusting better; Complete readjustment; excellent progress in regular grade
34..... Colored Aged 4 years Kindergarten	♀	Teacher has difficulty with patient who continually sucks finger on hand not fully developed and pulls hair out of back of head with other hand; constantly attracts teacher's attention	Aplasia of phalanges of four fingers of right hand; those of thumb present; admits teasing in school regarding this deficiency; intelligence quotient, 121	Deformity of hand considered a curiosity among schoolchildren; frequent teasing in kindergarten; increasing sensitiveness regarding deformed hand reported by mother	Training in proportion to her ability; avoid teasing or desensitize regarding teasing; ignore demands for attention; question of whether she should not be removed from school for a short period and then advanced was also considered	Complete reeadjustment; excellent progress in regular grade
35..... White Aged 7 years 1-B grade	♂	Sent from school as a dangerous child, screaming, tearing hair and running with scissors after another boy; has spells	At first impossible since patient was mute and apprehensive; on second visit stated he was very much worried about his mother; preoccupied with ideas that she is dead; autoeroticism with no associative conflict	Mother sent to House of Correction; one sister crippled and feebleminded; received practically no home training; previously assigned to Department of Public Welfare for placement	Secure home surroundings where he can receive benefit of interested guidance; pay little attention to spells	No improvement; corrective modifications were not carried out
36..... White Aged 12 years O.B.	♀	From Home School; furious temper; unable to progress in school	Tonsils enlarged; adenoids; Marked emotional instability; refuses to talk about her temper outbreaks in school; borderline intelligence; showed little interest in tests; intelligence quotient, 74	Father epileptic and alcoholic; mother worked and placed patient in a boarding house	Tonsil and adenoid operation advised; vocational training to enable patient to be self-supporting; psychiatric social service guidance and advice	Unknown; left city
37..... White Aged 12 years 7-B grade	♂	Lacks initiative; nervous; day dreams	No abnormal mental preoccupation present; dreaming type of boy; intelligence quotient, 109	Good environment	More stimulating routine in school along lines of special ability; more individual attention and encouragement; Boy Scout activities	Adjustment established; many interests; passing in all school subjects

38..... White Aged 11 years O.B.	♂	Inattentive; disobedient; self-willed; requires constant attention	Enlarged tonsils; boy over-active; intelligence quotient, 105	Mother never wanted children; arrival of patient undesirable; considered by mother a constant source of worry; child very affectionate; demands attention at all times; frequent colds	Attempt to change mother's attitude toward child; more personal interest, supervision and home training and maternal affection	Much improved; attended summer school and made up school grade
39..... White Aged 14 years 6-A grade	♂	Stubborn; misbehaves in school; truant for past one and one half years	Generalized lymph adenopathy; emotional, apprehensive; afraid he was to be operated on; worried about father's illness; feels it is unjust for him to stay in school when mother needs his help in earning a living; disinterested in tests; intelligence quotient, 91	Father psychotic; mother lenient, and protects children from criticism; mother works and children frequently left to their own devices	Vocational training along lines for special ability; teach him mechanical trade; psychiatric social service study of home conditions with appropriate remedies	No improvement; parents refused to cooperate and return boy to clinic
40..... White Aged 8 years 2-B grade	♂	Disobedience in school; mother unable to discipline patient except by scaring him	Temperature of 103; pulse, 160; grayish white membrane over tonsils; thick tongue; ailing throat; later reported as diphtheria	.....	Prompt admission to ward and antitoxin treatment	Improved; father refuses to have patient return to clinic
41..... White Aged 14 years	♂	Poor school progress; in backward class; no progress since second grade	Normal physically; infected teeth; unstable, restless and very suggestible; wishes to give impression of being "a very bad boy"; intelligence quotient, 92	Night terrors; father punishes him severely; lies to avoid this; "goat of the gang"; easily led	Attend trade school to fit for some definite vocation; interview with father regarding boy's reaction to punishment; productive occupation instead of dominance of gang	No improvement
42..... White Aged 12 years 5-A grade	♂	Patient is irritable and quarrelsome; misbehavior in school; spoken of as "mama's baby"	Phimosis; tonsils enlarged; carious teeth; emaciated; very sensitive; paranoid attitude; feels he does not get his just deserts in school; intelligence quotient, 93	Father psychotic, mother lenient and protects children from criticism; mother works and children frequently left to their own devices; sweats excessively	Tonsil and adenoid operation; circumcision; stimulate training along lines of special ability; stop smoking	No improvement
43..... White Aged 10 years	♂	Backward in school; incorrigible; heedless; restless; mimics other children and knocks them about	Blood pressure, 125 systolic, 85 diastolic; borderline deficiency; good work with performance tests; marked intellectual limitations; intelligence quotient, 76	Injury in April, 1919; since that time, marked change in disposition; irritable and forgetful; reported by teacher in OB class as "acts almost as if he were insane because of suddeness and speed with which he does things"	Clinic teaching; consider case one with organic features, safeguarding treatment if any other sequal of head injury develops	Traumatic constitution; no noteworthy change
44..... White Aged 10 years	♂	Steals; lies and runs away from home	Infected tonsils; phimosis; under-nourished; lack of energy and interest; marked mental conflict over autoeroticism; feels like running away at these times; marked interest in horses; intelligence quotient, 87	Good home surroundings; recently considered a disgrace to family by brothers and sisters	Circumcision and tonsillectomy; given facts concerning sex habit; measures for sublimation of sex habits into interest in horses by change of environment into country; more encouragement and help at home	Adjusting better; delinquent tendencies less marked
45..... Colored Aged 9 years	♂	Mischievous and incorrigible in school; two failures	Negative physical examination; no abnormal mental preoccupations elicited	Prefers to go with older boys; for past two years incorrigible; nervous after tonsillectomy and adenoidectomy, Sept., 1920, operated on at home; mother domineering; takes boy's part; condemns school and clinic	Case not studied completely; mother's attitude well shown by following: "public school system not what it used to be and teachers do not like him because he is colored"	Patient not treated; mother states she will take him from public to private school

TABLE 2.—*Data of the School Children—Continued*

Case	Sex*	Reason Referred by Teacher	Physical Examination	Situational Data	Corrective Modifications	Therapeutic Results, May, 1924
46..... Colored Aged 12 years	♂	Runs away from home.....	Well nourished; infected tonsils; small umbilical hernia; has sufficient ability for manual work; intelligence quotient, 65	Frequently severely punished by father; "crazy about movies"; (mother) oversuggestible; teased continually; nicknamed "runaway horse"; always taught not to fight	Careful supervision and habit training and encouragement; place on own resources; replace movies by other interests; train along manual lines; tonsil and adenoid operation	Adjusting well
47..... White Aged 6 years	♀	Has violent temper; untruthful; incorrigible; masturbates; truant	Marked under-nutrition; enlarged tonsils; overactive; alert mentally; intelligence quotient, 100	Marked domestic friction in home; family living in one room; child sleeps with parents; runs around uncared for all day while mother works; mother nervous; states that she had always been a very timid and nervous child	Change in environment where child can have benefit of normal training and surroundings; tonsillectomy	Gradual improvement
48..... White Aged 8 years 1-B grade	♂	Repeated first grade three times; indifferent to lack of progress	Visual defect; infected tonsils; dental caries; no mental conflict elicited; indifferent; very much interested in making things; plays with tools in garage; likes number work; does not like reading or spelling; excellent manual ability; intelligence quotient, 90	Very obstinate and selfwilled at home; torments mother; must always have his own way; over-indulged; gets along well with companions; enuresis	Tonsillectomy; dental care; eye examination; careful habit training at home; training along lines of special ability (manual)	Improving both physically and psychobiologically
49..... White Aged 13 years 4-B grade	♀	Lacks concentration; nervous	Palpable thyroid gland; probably hypertrophy of puberty; good nutrition; expresses many fears; in school, constant dread of doing things wrong; afraid of the dark; gets excited easily; prefers young children as associates; feeling of inferiority	Has no definite responsibility about house; must have light burning all night in the room; over-indulged and petted by aunt	Place on own resources; give definite work to do at home; competition with other children; ignore her many fears and complaints; definite routine regarding work and play; prepare for problems of adolescence	Progressive improvement; interested in housework; anxious to attend School of Occupational Therapy
50..... Colored Aged 13 years 5-A grade	♂	Plays truant; doing poor work in fifth grade	Well developed; well nourished; enlarged tonsils; phimosis; poor interest; manual trainability good; felt excited since last April after attending a movie "in which many people were killed," and there were "cowboys, guns and everything"; this was followed by many dreams; always felt frightened at night, imagining he was seeing things, etc.; complains of headaches ever since previous attack of pneumonia; intelligence quotient, 68	Only quieted at night when taken into mother's bed; always gains own way at home; parents referred to his former serious illness; drinks coffee at least three times a day, in large quantities; eats before retiring; many bad dreams	Circumcision operation advised; careful dietetic routine; refrain from stimulants; sleep by himself, etc.	Gradual improvement as advise given was followed

* In this column, ♀ indicates female, ♂ male.

of appetite, lack of sphincter control, thumb-sucking, etc. The teacher's reasons for referring these children were: temper outbursts, obstinacy, disobedience and poor general adaptability to the school routine and illustrate the general traits of character present. Environmental conditions are of importance, in that they show the part played by the father and mother in the development of the faulty mental reactions of the child as well as the influence of poor associations and faulty dietetic and sleeping arrangements.

Typical case histories will be of value to illustrate our findings.

REPORT OF CASES

CASE 20.—H., a boy, aged 10 years, was sent to the clinic on account of general nervousness and poor school work. When he first began school he was placed in the speech defect class. He sucked his cheeks and drew his mouth into queer shapes. He developed many complaints such as inability to sleep and complained of severe pains in his stomach. The family doctor, who frequently examined the patient, said these were mainly the result of imagination. The patient had a very peculiar appetite, refusing eggs, meat, milk and sometimes vegetables. At times when he ate bread and butter he said that it made him sick. He had the average childhood accidents. His mother constantly rehearsed them in his presence. The background of this case and the onset of the trouble was the change from a rural environment to the city two years ago. He had always dominated the home situation, was overindulged by his mother, who went so far as to give him food at 2 a. m. He was told not to associate with other boys because they were too rough. It was necessary for his mother to sleep with him in order to quiet him.

Examination revealed a bright, active child who enjoyed discussing his nervousness and his inability to eat certain things. He showed a speech defect. The intelligence quotient was 88 with excellent performance ability. Physically, he showed undernutrition. Corrective modifications in this case consisted of careful habit training at home regarding eating and sleeping arrangements. Of course, this meant re-education of his parents along these lines and several interviews were arranged in the clinic for this purpose. The parents were also advised to increase the boy's activities and have him associate with other children, and to ignore his whims regarding food. This case proceeded very slowly and we cannot but feel disappointed in the end result, although the boy has shown definite improvement. Re-education of the parents, as attempted by the psychiatrist and several social service workers, was extremely difficult and finally unsuccessful. The boy continued to be spoiled and overindulged at home, although there was some gain in weight and improvement in his dietetic routine. At school Harry is now in the fourth grade, and is receiving treatment by the family physician, who has been given the full facts concerning our examinations.

CASE 7.—This case was more encouraging. H., a boy, aged 6, was referred from school because he was wilful, stubborn and hard to train. Physically, he showed slight undernourishment. While in the clinic he demanded considerable attention from his mother and it could be readily seen how he controlled the situation. A general résumé of the case is as follows: He never felt hungry, and it was necessary for his mother to force him to eat. He existed chiefly on a very abundant and irregular candy diet. He stole pencils from other children. He had frequent temper tantrums, lying down and screaming when asked to perform some unpleasant duty or when a meal was put before him. He was very remorseful after these attacks. He was very restless at night and had to be reminded to go to the toilet, or that he was untidy. As early as the age of 3 years his main diversion was throwing milk bottles at other children. Treatment for this lad had to begin with re-education of the parents to try to establish

insight into their boy's problem. They were to try to ignore his temper outbreaks. A change of environment during the summer months was effected by sending him to a boy's camp. A sensible dietetic and sleeping routine had the desired results. Following this the boy showed marked improvement at home. It was necessary, however, to send him to an orthogenic backward class. Later he improved and was placed in the regular school. The ultimate outlook for an excellent adjustment is good.

These cases are very similar in that the general problem of treatment concerns the parents. Behavior disorders encountered in school children are frequently the result of unfortunate character and habit formation at home. A boy who will defy authority at home by temper tantrums and capriciousness regarding his food, will naturally attempt to dominate the school situation in the same way. The parents can best be brought to have a helpful and sensible attitude by interviews with the psychiatrist, and later visits from either the psychiatric social workers or the visiting teacher to get a complete study of the home conditions. When the cooperation of the parents is lacking, as in the first case mentioned, the ultimate outlook is frequently very discouraging.

From the mental hygiene viewpoint there appears to be no doubt that the early examination and treatment of average cases of this sort are of the utmost importance. We can expect that when such a child enters the adult stage he will likewise continue to attempt to dominate the situation by temper tantrums, and when he finds he cannot do so he will tend to withdraw from contact with his environment and from the realities of life, as is noted in the prolonged, unfavorable psychotic reactions of later life.

CASE 49.—L., a girl, aged 13 years, is now in the fourth grade. It was noted in school that she was very nervous and lacking in concentration. The home situation was interesting. Laura was an orphan and was cared for by an elderly aunt. She had always been afraid of the dark and insisted on having a lighted lamp in her room all night. She was given absolutely no responsibility about the house. All her fears and whims were given into by an oversympathetic aunt. Examination showed that physically Laura was in excellent condition. The thyroid gland was palpable. She described her school difficulties by expressing feelings of inferiority, and was obsessed by the fear that she would always do things wrong. She was emotional. She preferred younger children as associates. She was very shy and sensitive concerning her condition.

Corrective modifications: The advice to place this child on her own resources, to stimulate her with some definite vocation, to encourage her to enter competitions with the other children and to ignore her many fears and complaints, led to the establishment of a definite routine regarding work and play. The progress notes were interesting. Two months later she described spontaneously her simple household duties and was very much interested in cooking. Several months later these interests had crystallized into the definite desire to go to a school for domestic science or occupational therapy. The patient at the present time is getting along much better. She has been advanced one grade in school. She has given up her fears of the dark and has made a complete readjustment both in school and at home.

The affective instability in this case with definite feelings of inferiority were related to the home situation. Over indulgence by her aunt, no responsibility about the house naturally led to conflict and difficulties in meeting the problems

of her environment. The cooperation of the aunt led to a speedy adjustment. After establishment of adjustment it was considered very wise to prepare this girl for the problems of adolescence, and to clear up many of her fears concerning menstruation so as to prevent later difficulties.

CASE 34.—S., a girl, aged 4 years, was in the kindergarten. Her teacher reported that she was very nervous, continually sucked her fingers and frequently pulled her hair out of the back of her head. The teacher tried various methods of breaking her of these habits but was unable to do so. The child attempted at all times to attract the teacher's attention. The mother stated that the child had always been sensitive concerning her deformed hand. She attempted to comfort her by saying that she was born that way and should not worry about it. The hand was a curiosity and the school children often asked the patient to show it to them. She became very sensitive and began sucking her fingers and pulling her hair. At home she was extremely irritable when with her older brother.

Examination in the clinic revealed marked chronic tonsillitis and aplasia of the phalanges of four fingers of the right hand. Her intelligence quotient was 121. She was considered a precocious child and trainable. Her behavior abnormalities were largely due to the marked attention and curiosity of the older children concerning the deformity of her hand. Her craving for considerable attention from the teacher was a reaction to teasing by girls in the kindergarten, who frequently jeered: "just look at her right hand."

Corrective modification consisted in ignoring her behavior abnormalities, less attention in school, careful discipline both at home and at school, encouragement to disregard teasing and a frank talk with the child concerning the deformity of her hand. In this talk she indicated a feeling that she must be different from all the other children.

The psychometric data were of value as an aid to our study of the individual pupil and frequently aided in the determination of special abilities and disabilities. For instance, many children showed poor intellectual ability and good manual ability. This knowledge helped us when considering vocational guidance (Cases 14 and 15). Some children of this type, as in Case 1, adjusted themselves as soon as they began work after leaving school. In general, the psychometric results related directly to school standing and progress. Three were classified as mentally deficient (Cases 5, 15 and 21). Several superior children with an intelligence quotient of 115, were found in the routine psychologic tests similar to Case 23. Case 34 with an intelligence quotient of 121; Case 37, with an intelligence quotient of 105 and Case 39 with an intelligence quotient of 105 are illustrative. The high intelligence quotients indicated the need of a more stimulating school environment. Delinquency on the basis of superior mental ability is well known, and is frequently changed by advancing the child one grade in school. The apparent high intelligence quotient of 121 in Case 34 is really normal for a growing girl aged 4 years. There are many limitations to interpreting psychometric findings, and in no case should they be used as a "meter stick" of mental ability. The personality trends and resources of the pupil are of far more importance and value in the adjustment of

the school child. Emotional states [4] often lead to an inaccurate intelligence quotient and so are unfair to the child. The following girl with an intelligence quotient of 60 well illustrates this assertion.

CASE 21.—B., a girl, aged 16 years, was referred to the clinic from school because of her inability to progress further and the tendency to discuss sex topics. It was noticed during the last year that she frequently stole.

Physical Examination.—A well nourished, well developed girl was seen. Her tonsils were enlarged and cryptic. The Wassermann examination was negative. Psychologic examination revealed an intelligence quotient of 60. In this examination foreign birth, poor home conditions and the mental conflict present were considered to influence this result. A diagnosis of moron was made.

Mental Examination.—The patient stated that she began stealing after a change of residence from South Philadelphia to West Philadelphia. She was unable to fit in with the school group. She became upset when lewd topics were discussed, and developed marked conflict concerning sex topics. It was after these discussions that she stole, always money, with which she used to buy clothes. In school she was quite dissatisfied. She said that she was mocked by the other children who read after her, called her names and continually teased her. The patient admitted feeling very much worried concerning menstruation, established three years previous to this examination. She had been under the impression that she was bleeding to death. During these periods she complained of pains throughout her body and inability to sleep at night.

Treatment in this case consisted of careful talks between the girl and the psychiatrist and psychiatric social service worker, to lead to sublimation of sex interests into useful channels, such as by taking some interest in athletics and in some definite vocation. She was given the full facts in a simple fashion concerning her worries over masturbation, and apparently gained benefit and insight into these matters from this interview. The menstrual function was also explained and this the patient readily grasped.

The girl continued to get worse and finally she was taken from school. After a rest period in the country, she began to work in a department store where she made an excellent adjustment. She is now a wage earner and her stealing propensity has disappeared entirely. She is considered to have adjusted to her level excellently.

This case was of interest because we felt that the low intelligence quotient in this girl was unreliable, owing to the personality disorder present, mainly, her worry and preoccupation concerning sex questions. Frank discussion of the sex question, taking her from school and beginning an appropriate vocation resulted in normal adjustment which gave every indication of being permanent.

Case 50 was of a similar type.

CORRECTIVE MODIFICATIONS

Treatment precedures have already been indicated in the remarks concerning the examination findings. In the main these consist of (1) measures to effect physical improvement. General pediatrics and internal medicine is therefore of paramount importance; (2) the re-education of the parents to enable them to instil proper habit training in their children is essential. We know of no definite technic to accomplish this difficult task. An interview with both parents is advisable, in order that the details of the child's problem can be explained

4. Jewett, S. P., and Blanchard, P.: Influence of Affective Disturbances on Responses to the Stanford-Binet Test, Mental Hygiene **6**:39 (Jan.) 1922.

in simple terms. The charts devised by Thom [5] are of great value in these attempts to change the parent's attitude. The psychiatric social service worker, clinic teacher and nurse must work in close cooperation. A study of the actual home situation by the social service worker should always be made. The attitude of the parents is frequently reflected in the child's difficulties. For instance, one child (Case 1) had the same paranoid ideas toward the school teachers as were expressed belligerently by his mother.

Finally, dealing with the child himself we attempt to use therapeutically the chief mental characteristics of childhood. First, the plasticity of the child allows us to make headway in actually remodeling personality. The marked suggestibility of the child, as well as imitativeness and response to encouragement and rational discipline are important therapeutic guide-posts. Analysis may be of value, particularly in cases showing mental conflict. Here, if the conflicts are of sex origin, it is wise to give simple facts concerning sex physiology and thereby avoid false conclusions and curiosity gained frequently through the medium of the "gang." The principles of Barker [6] and Campbell [7] are of great importance in therapeutic results. The psychometric reports as utilized in treatment have already been described. A change of environment is often very helpful.

THERAPEUTIC RESULTS

After one year's treatment, definite improvement and better adjustment was established in twenty-nine children of this unselected group. Considering that the school difficulties in the majority of these cases were of long duration, one cannot help but feel that even more gratifying results could be obtained if schoolchildren were examined at the very beginning of their difficulties. Those difficulties indicate the need of establishing preschool habit clinics, school clinics, as well as adolescent clinics for the neuropsychiatric study of the whole group. Thom [8] has demonstrated improvement in the majority of these cases studied in preschool habit clinics.

The data of improvement in our cases were obtained by direct examination of the children by the psychiatrist usually with the opinion of the parents, findings of the school teachers and social service workers. Several other children are improving and further study may prove to

5. Thom, D. A.: Leaflets for Parents, Mental Hygiene Bulletin, January, February and March, 1924.

6. Barker, L. F.: Principles of Mental Hygiene Applied to the Management of Children Predisposed to Nervousness, Mental Hygiene, 1920.

7. Campbell, C. M.: Nervous Children and Their Training, Mental Hygiene **3**:16 (Jan.) 1919.

8. Thom, D. A.: Habit Clinics, Mental Hygiene **6**: (Aug.) 1922.

be productive of good results. Many others may adjust when they leave school and enter some vocation, as was noted in the first boy examined.

COMMENT

This study indicates the absolute necessity of close cooperation between the school authorities and mental clinics. Early maladjustment always is discoverable in school, and prompt study should be productive of good results and a great aid to the individual teacher and school.

The goal of education is to produce well balanced persons who will adjust to their environment by meeting the realities of life instead of by evading personal problems, and so developing faulty habits and poor social adaptation.

Character training is as important as school instruction for efficiency and health. The cases summarized show the relation of emotional life, home environment and training to school progress, and indicate the necessity for the study of the individual child in his total reactions to the school situation.

The study of such a group of children is of practical significance when we consider that the school constitutes the real health center for the child in any district, and affords the best chance for routine physical and mental examinations. General ignorance of the principles of correct training of the child during the preschool and school age constitutes one of our most important public health problems. To meet this problem, a closer relationship should be established between the school and the home through the agency of the visiting teacher, specially trained nurse and the social service worker. Definite instruction in mental hygiene in all normal schools would be of great help to the teachers in lessening the routine problems that they meet in the management of behavior disorders in their pupils. School physicians trained in mental hygiene, school neuropsychiatric clinics in association with medical clinics and observation wards in general hospitals will be needed in this step.

CONCLUSION

A study of fifty unselected cases referred by teachers of regular schools have been summarized from the viewpoint of physical, mental, psychometric and environmental findings. Corrective modifications have been suggested and the therapeutic results after a period of at least one year discussed.

The school should be considered as the children's health center of the district. This means care for their mental as well as their physical well-being. School clinics, operating in close cooperation with the

mental clinics of the district, and children's observation wards in the general hospitals will all be needed in meeting this important public health problem.

The maladjustment of the child of today has a definite connection with the abnormal mental reactions or actual psychoses of the adult of tomorrow. The principles of preventive psychiatry, therefore, demand the early treatment of maladjustment in its incipiency, when proper steps may be instituted to establish social adaptation at the person's highest level of efficiency.

STAIR CLIMBING AS A TEST OF CARDIAC FUNCTION *

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In the summer of 1923, the Sunset Camp Service League of Chicago, a philanthropic organization which maintains a camp ordinarily used for the recreation of Jewish working girls, organized a plan to use the camp during September for the care of a group of girls with chronic heart disease. The project was rather experimental in nature, the object being to determine, if possible, the value of such an experience to the patients treated.

The camp used is situated on the shore of a small lake sixty miles northwest of Chicago. It covers five acres of dry and wooded ground which is about from fifteen to twenty feet above the lake level. The buildings include the main house, which has a large porch, living room, dining room, kitchen and lavatories on the first floor and dormitories on the second and third floors; also a smaller cottage with additional sleeping quarters. There are facilities for tennis, dancing, rowing, bathing and the usual recreations of a summer camp.

The patients chosen were picked by the staffs of three of the larger cardiac clinics of Chicago, and were designated either as with a normal exercise tolerance or a slightly diminished one. Three children were included, however, who had a rather marked disability and six who had no evident heart lesions, but were classed as "potential cardiacs" or cases of malnutrition. The cases of the three badly disabled children are not included in this paper. Ten children were designated as with a slightly diminished exercise tolerance. The ages of the twenty-nine girls considered varied from 7 to 17 years. Nineteen of them ranged in age from 9 to 12 years.

Following two or three days of physical examinations the camp routine was rapidly established. This included ten hours rest in bed at night and two hours during the day, two and one-half hours of school, one-half hour of formal exercise and two and one-half hours of supervised play. Free periods, house duties, inspections and indoor games filled in the day. The formal exercises used are those recommended by St. Lawrence [1] as being in use at the Cardiac Clinic of St. Luke's Hospital, New York. Supervised play included bathing, rowing, hiking, volley ball, base ball, dancing and various other outdoor games. Milk was served at all meals and also at 10:30 a. m. and 3 p. m.

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* Received for publication, June 17, 1924.

1. St. Lawrence, W. P., and Adams, E. L.: Organized Care of Cardiac Children, Hospital Social Service, **2**:151, 1920.

It was our chief medical concern to determine, if possible, whether the cardiac function in our various patients would improve over the admittedly brief period of four weeks.

REVIEW OF THE LITERATURE

A survey of the literature reveals at once that there is no commonly accepted test for measuring the degree of efficiency with which the heart functions. Not only have various tests been worked out by some experimenters and declared unacceptable by others, but the physiologic reaction of the cardiovascular system to work, as manifested by blood-pressure and pulse rate changes, has not been uniformly agreed on. It is accepted that in a normal subject both the blood pressure and pulse rate are raised by work, and that within a certain period after cessation of work they fall to normal. The period necessary for this adjustment to normal has been designated as the reaction time or period. Barringer [2] found that myocardial insufficiency produced a typical curve when the blood pressure was plotted following exercise, and that instead of the usual rather abrupt fall beginning within thirty seconds after cessation of exercise, there was a "deferred rise," the maximum pressure being attained about sixty seconds after cessation of exercise. Wilson [3] confirmed this finding, using normal children and children with heart disease as subjects. She explains that the phenomenon was produced in normal patients following exhaustive exercise, but that in children with heart disease it took less work to produce it. Gräupner [4] found that myocardial insufficiency was manifested after severe exertion by (1) a slight rise of blood pressure (10 mm.) with a quick fall to below normal, (2) a fall instead of a rise or (3) by a sustained high blood pressure with a sudden fall. It is presumed that this last manifestation may not be unlike the "deferred rise" elicited by Barringer and Wilson. The Sehams,[5] in their recent comprehensive work, were unable to reproduce this deferred rise even after the most exhaustive work. Crampton [6] and Schneider [7] formulated tests purporting to determine

2. Barringer, T. B., Jr.: The Circulatory Reaction to Graduated Work as a Test of the Heart's Functional Capacity, Arch. Int. Med. **17**:363 (March) 1916.

3. Wilson, May G.: The Circulatory Reactions to Graduated Exercise in Normal Children, Am. J. Dis. Child. **20**:188 (Sept.) 1920; Exercise Tolerance of Children with Heart Disease, J. A. M. A. **76**:1629 (June 11) 1921.

4. Gräupner, quoted from Seham, Max, and Egerer-Seham, Grete: Physiology of Exercise. Part 3. An Investigation of Cardiovascular Tests in Normal Children and in Children with Tuberculosis and Valvular Heart Disease, Am. J. Dis. Child. **26**:554 (Dec.) 1923.

5. Seham, Max, and Egerer-Seham, Grete: Physiology of Exercise in Childhood. Part 1. A Study of Normal Children of School Age, Am. J. Dis. Child. **25**:1, (Jan.) 1923; Part 3. Am. J. Dis. Child. **26**:554 (Dec.) 1923.

6. Crampton, C. W.; Blood Ptosis, New York, M. J. **93**:916, 1913.

7. Schneider, E. C.: Cardiovascular Rating, J. A. M. A. **74**:1507 (May 29) 1920.

cardiovascular fitness, based on the blood pressure and pulse rate changes induced by change of posture. They found that both blood pressure and pulse rate increased on changing from the lying to the standing position. The Sehams [5] applied the tests of Schneider and Crampton also, and found neither one applicable to children. They also found a consistent fall in blood pressure, rather than a rise, on changing from the lying to the standing position. Less stress seems to have been laid on the value of reaction time of the pulse rate than on that of the blood pressure. Meakins and Gunson [8] studied fifty-two soldiers with "irritable heart" and devised the test of having their patients walk seventy-five paces at quick time, terminating with a quick climb of twenty-seven steps (an 18 feet elevation). In thirty-two cases the pulse rate reacted to normal within one minute. Of the remaining twenty who required more time, 70 per cent. "could not progress beyond the simplest exercises and the remaining 30 per cent. did so with difficulty." They also found a marked relationship between the pulse reaction time and palpitation and dyspnea. On studying a group of normal children Wilson [3] concluded that the pulse rate returned to normal within two minutes in a majority of instances, regardless of the severity of the exercise. Hence, she concludes, it has no value. The Sehams [5] found that after exhaustive exercise the pulse rate in the majority of a group of children seldom returned to normal within ten minutes, and hence the reaction time was too long to be of value.

THE STANDARD TEST

Since, then, there seems to be no accepted standard test for judging how efficiently the heart functions it was decided to put our patients through a roughly standard work test, making subsequent determinations of the time necessary for the pulse and systolic blood pressure to react to normal. If this reaction period represents the time necessary for readjustment of the circulatory apparatus to normal after a piece of work, we assumed that a more rapid readjustment would indicate an improvement in the cardiac function. We applied the following test, therefore, soon after arrival at the Camp (within ten days) and repeated it in the last four days of the period, hoping that the second set of tests might show a decrease in the pulse rate and blood pressure reaction times as compared with those of the first set of tests.

The work test evolved consisted of a rapid climb (a trot) up forty steps, an elevation of 23 feet, from the ground to the third floor. This included walking on the level about 20 feet and making five turns. It was usually accomplished in about twenty-three seconds. For a five minute period prior to the climb the patient was seated at the foot of the stairs, then the blood pressure and pulse rate recorded. Immediately

8. Meakins, J. C., and Gunson, E. B.: The Pulse Rate After a Simple Test Exercise in Cases of "Irritable Heart," Heart **6**:285, 1915-1917.

following the climb the patient was again seated at the top of the stairs and the blood pressure and pulse rate read every thirty seconds for a period of six minutes. The six minute period was arbitrarily chosen and made no longer because of the rather tedious experience to the patient. The pulse rate was based on a ten-second period just prior to the period for which it was recorded. For instance, a pulse rate cited as at thirty seconds was based on the rate during the period of from twenty to thirty seconds after cessation of work. The foregoing test was determined on after the application of milder, similar tests without any apparent detriment to the patients. For the remainder of the paper the earlier test will be referred to as Test 1 and the later test as Test 2.

STUDY GROUPS

For purposes of study the patients were classified in three groups, based chiefly on physical examination. Group 1 consisted of six girls

TABLE 1.—*Blood Pressure and Pulse Rate*

	Percentage of Cases in Which Blood Pressure Reacted to Normal within											
	½ Min.	1 Min.	1½ Mins.	2 Mins.	2½ Mins.	3 Mins.	3½ Mins.	4 Mins.	4½ Mins.	5 Mins.	5½ Mins.	6 Mins.
Test 1:												
Group 1	0	0	17	33	50	67	67	83	83	100	..	..
Group 2	0	7	7	7	29	36	50	65	79	79	86	86
Group 3	0	0	11	11	11	44	44	44	44	55	55	55
Test 2:												
Group 1	0	0	17	17	17	33	50	57	57	57	100	..
Group 2	0	0	7	7	29	36	43	43	43	50	72	79
Group 3	0	0	0	0	0	11	11	22	44	55	67	67
	Percentage of Cases in Which Pulse Rate Reacted to Normal within											
	½ Min.	1 Min.	1½ Mins.	2 Mins.	2½ Mins.	3 Mins.	3½ Mins.	4 Mins.	4½ Mins.	5 Mins.	5½ Mins.	6 Mins.
Test 1:												
Group 1	0	17	17	67	83	83	83	83	83	83	83	83
Group 2	14	22	36	50	65	65	72	79	86	86	100	..
Group 3	0	22	55	67	67	78	78	78	78	78	78	78
Test 2:												
Group 1	0	17	17	33	50	50	67	67	67	67	67	67
Group 2	7	22	36	43	58	65	72	79	86	86	86	86
Group 3	22	22	22	22	44	55	67	78	78	78	78	78

with no evident heart disease. Three of these were malnutrition cases (not marked), one being a tuberculosis contact and three had a rheumatic history, but showed no evidence of heart lesions. Group 2 consisted of fourteen girls with low grade heart disease. All of these except one were cases of mitral regurgitation with no appreciable or only slight cardiac enlargement. The one exception was a girl with a congenital lesion, probably a patent ductus arteriosus. In Group 3 there were nine girls with more severe heart damage. Several of these had definite mitral stenoses and two had combined mitral and aortic lesions.

A study of the individual blood pressure curves reveals a wide variation in each group. In Group 1, for instance, the blood pressure reaction period in Case 4 (L. B.) was one and one-half minutes in both Test 1 and Test 2. Case 5 (R. S.) gave a reaction time of five minutes

in Test 1 and five and one-half minutes in Test 2. Groups 2 and 3 show similar wide variation in individual curves. A study of Table 1, however, does reveal that, on the whole, the blood pressure reacted more slowly in Group 2 than in Group 1, and in Group 3 than in Group 2. The increased reaction time seemed especially noticeable in

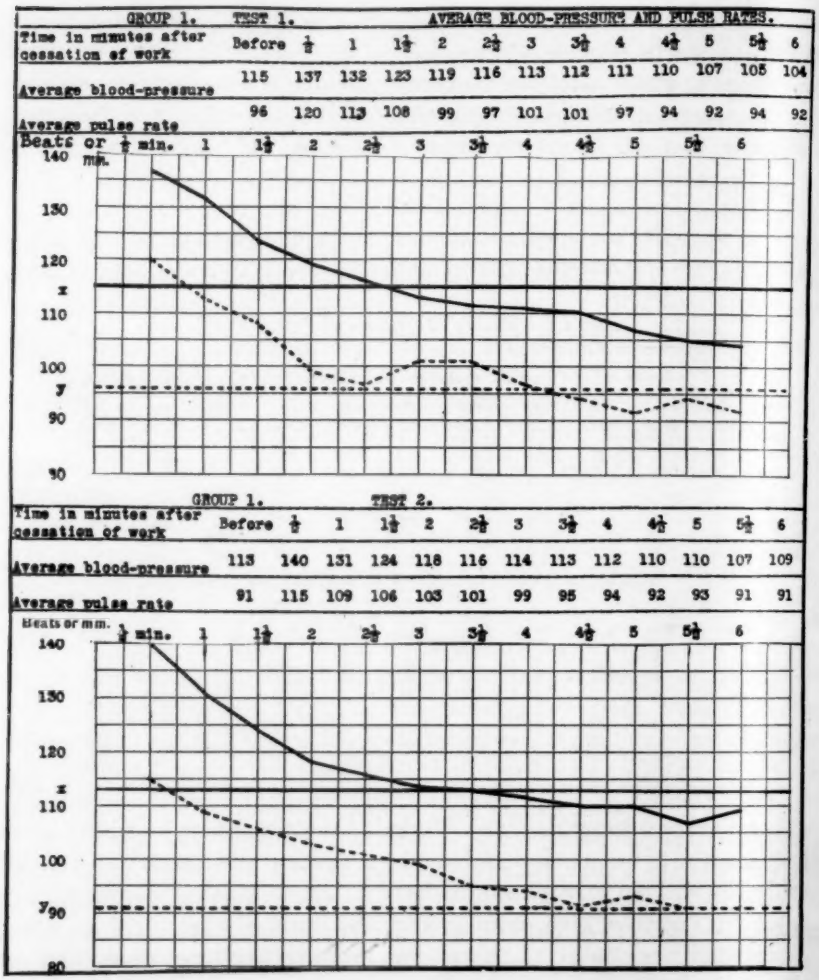

Chart 1.—Average blood pressure and pulse rates in children, aged 12.6 years; x equals average blood pressure at rest; y_0 equals average pulse rate at rest.

cases of mitral stenosis. Charts 1, 2 and 3, in which the average curves of the various groups are plotted, emphasizes especially the longer reaction periods elicited in Group 3. In only one instance was anything resembling a "deferred rise" noted. This was in a malnourished girl

who did not have heart disease. Her resting blood pressure was 118 mm. One-half minute after exercise it was 124 and at one minute 142, from which it subsided to 118 at the end of five minutes. It is possible, however, that this phenomenon might have been demonstrated more often with more frequent blood pressure readings. The test also was not an exhaustive one.

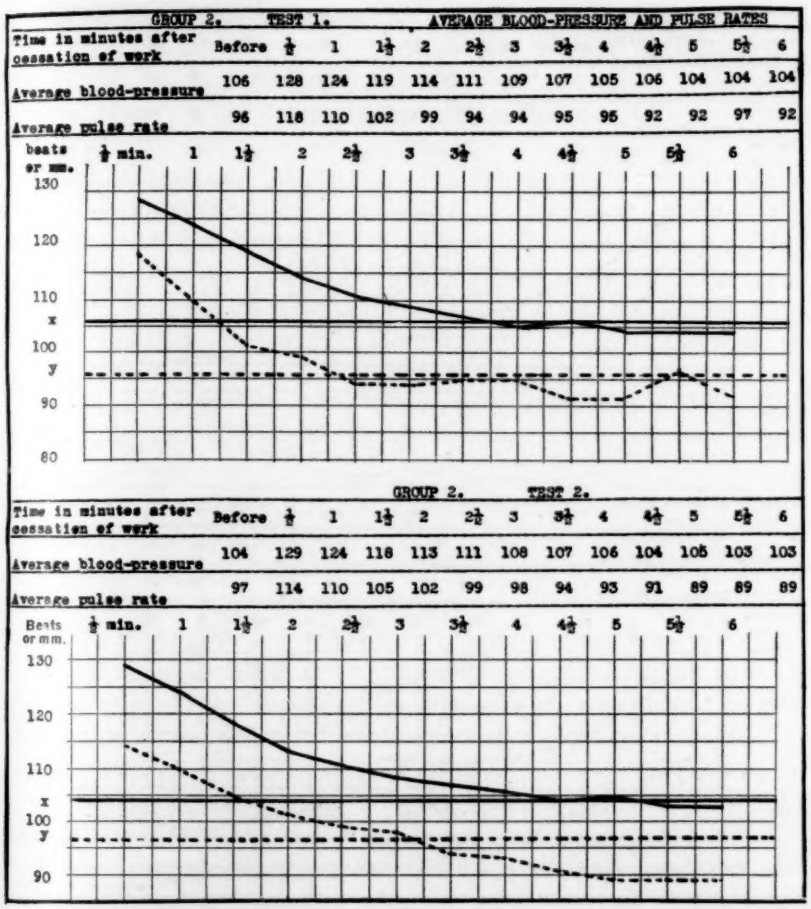
GROUP 2. TEST 1. AVERAGE BLOOD-PRESSURE AND PULSE RATES
Time in minutes after cessation of work
Before ½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
Average blood-pressure
106 128 124 119 114 111 109 107 105 106 104 104 104
Average pulse rate
96 118 110 102 99 94 94 95 95 92 92 97 92
Beats or mm.
½ min. 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
130
120
110
x
100
y
90
80
GROUP 2. TEST 2.
Time in minutes after cessation of work
Before ½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
Average blood-pressure
104 129 124 116 113 111 108 107 106 104 105 103 103
Average pulse rate
97 114 110 105 102 99 98 94 93 91 89 89 89
Beats or mm.
½ min. 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
130
120
110
x
100
y
90

Chart 2.—Average blood pressure and pulse rates in children aged 10.6 years; x equals average blood pressure at rest; y equals average pulse rate at rest.

The individual pulse rate curves show an even wider variation than the blood pressure curves. A rather common manifestation was a slight secondary rise at about from the three to four minute period and this is reflected in the average curves plotted in Charts 1, 2 and 3. Rather strangely, this is noted in the average pulse rate curves only in Test 1

and a study of the individual curves, likewise, reveals it to be more frequent in the earlier tests. This secondary rise of pulse rate is by no means constant nor characteristic of any one of the three groups.

The relationship between the blood pressure and pulse rate curves is one of approximate parallelism, although this is more marked in the average curves of Charts 1, 2 and 3 than in many individual curves.

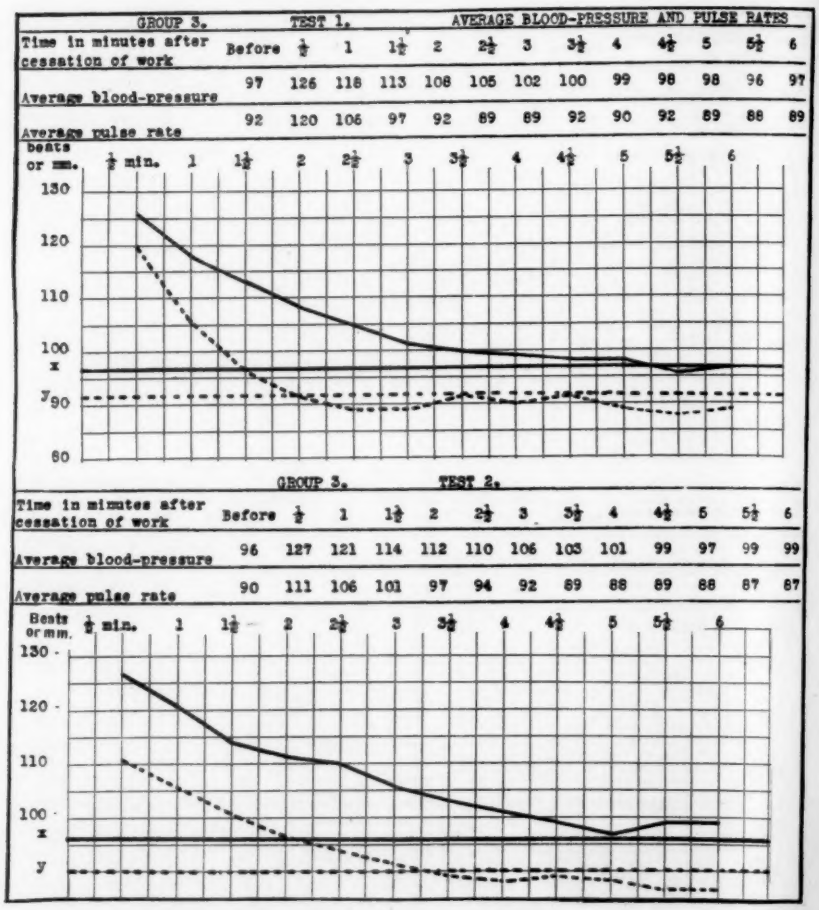
GROUP 3. TEST 1. AVERAGE BLOOD-PRESSURE AND PULSE RATES
Time in minutes after cessation of work
Before ½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
Average blood-pressure
97 126 118 113 108 105 102 100 99 98 98 96 97
Average pulse rate
92 120 106 97 92 89 89 92 90 92 89 88 89
Beats or mm.
½ min. 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
130
120
110
100
x
y 90
80
GROUP 3. TEST 2.
Time in minutes after cessation of work
Before ½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
Average blood-pressure
96 127 121 114 112 110 106 103 101 99 97 99 99
Average pulse rate
90 111 106 101 97 94 92 89 88 89 88 87 87
Beats or mm.
½ min. 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
130
120
110
100
x
y

Chart 3.—Average blood pressure and pulse rates in children aged 10.1 years; x equals average blood pressure at rest; y equals average pulse rate at rest.

Chart 3 shows a slight convergence toward the end of the six minute period. Charts 2 and 3 show that the lines of average blood pressure and pulse rate, with patients at rest, lie rather close to each other, the difference on the vertical scale being from 5 to 10 points. In Chart 1, Test 1, the average blood pressure at rest is 115 and the pulse rate 96, a difference of 19 points. In Test 2 the corresponding figures are 113

and 91, with a difference of 22. The wider separation of these two lines in Chart 1 is obviously due to the higher average blood pressure. The average age of the patients in Group 1 was 12.6 years, as against 10.6 in Group 2 and 10.1 in Group 3, and this age difference probably partially accounts for this variation. It is noted that individually, both blood pressure and pulse rate curves in most instances tend to fall not only to but below the lines representing the blood pressure and pulse rate curves at rest. This is reflected in the average curves of Charts 1, 2 and 3. It is probably partially due to the difficulty in determining fairly the blood pressure and pulse rate at rest. No matter how judiciously such a test is approached, these children exhibit a certain amount of nervousness and anxiety that undoubtedly increase their resting blood pressures and pulse rates. If this psychic element could be entirely dissipated, their blood pressures and pulse rates when at rest would both undoubtedly be lower and the reaction times correspondingly longer. In one rather nervous girl a fall of 16 mm. in the blood pressure was noted in the course of a few moments when the resting blood pressure was being determined. It apparently subsided with the growing realization that the procedure was perfectly harmless.

The stair climb was carried out fifty-eight times in all. In forty instances the pulse rate preceded the blood pressure in the fall to normal. The reverse was true on fourteen occasions. In three instances the blood pressure and pulse rate reaction period were the same and in one they both exceeded six minutes. Group 1 contributed five of the fourteen cases of blood pressure preceding pulse rate in the fall to normal.

A comparison of the reaction times determined in Test 2, as against those of Test 1, gave no clue as to improved cardiac function (Tables 2, 3 and 4). In Group 1 the blood pressure reaction time increased in five instances and was unchanged in one; the pulse rate reaction time increased in three, decreased in one and was unchanged in two. In Group 2 the blood pressure reaction time increased in six cases, decreased in six and was unchanged in two; the pulse rate reaction time was increased in nine, decreased in four and was unchanged in one. In Group 3 the blood pressure reaction time increased in six cases, decreased in two and was unchanged in one; the pulse rate reaction time was increased in five, decreased in three and was unchanged in one. If a decrease in blood pressure reaction time is considered the criterion for improved cardiac function the entire group fared rather badly. Using such a premise five of the six children without heart disease were harmed, half of those with mild heart disease improved and the other half suffered, and two-thirds of the group with more severe lesions retrogressed. Similarly, if a decrease in pulse rate reaction time is taken as a standard of improvement the results as a whole were not

favorable. It should be emphasized that in such a calculation Group 1, the children without heart disease, fared the worst. Any such deductions as the foreging are undoubtedly incorrect.

To substantiate this is opposed the general improvement that was evident in all these children at the end of the period. The average weight change in the whole group was a gain of 2.24 pounds. It may be significant that the average weight gain in Group 1 was about two and one-half times as much as that in Group 2 and almost twice as much as that in Group 3. There seems to be, however, no association between the individual weight changes and the corresponding blood pressure and pulse rate reaction periods (Tables 2, 3 and 4). The stair climbing test was performed in every case, with apparently no more discomfort than might be apparent in a normal child. Similarly the days were pretty well taken up with rather strenuous exercise. All of the children under consideration danced, hiked, rowed, bathed, played base ball and volley ball, and acted like normal children. Not once was excessive dyspnea or undue fatigue observed. After a fairly strenuous day these children would invariably come up for the quieter indoor games in the evening with all the enthusiasm and vigor of normal children. In the light of these observations it is difficult to conclude other than that the general condition, at least, of these children improved and it seems logical to presume that in this general improvement their hearts shared. A follow-up report four months later is to the effect that their progress has continued, and that only two of the twenty-nine patients have been ill in the interval and in neither of these was the trouble cardiac in nature.

From the practical standpoint, then, it may be plausibly argued that since none of these children evidence other than a normal exercise tolerance the heart function could not be expected to improve. Hence a comparison of Test 2 with Test 1 has no value. This deduction is probably correct, but does not explain the general tendency to both a longer blood pressure and pulse rate reaction time after an interval of from three to four weeks of obviously beneficial rest and recreation.

CONCLUSIONS

1. Ten children recommended, on the basis of history and physical examination, as having chronic heart disease with slightly diminished exercise tolerance performed the activities of normal childhood easily and without evident physical detriment.

2. Rather strenuous stair climbing was performed by this group easily and without evidence of cardiac embarrassment.

3. A study of the blood pressure reaction changes after a given piece of work reveals that in children with mild heart disease the reac-

TABLE 2.—*Individual Reaction Periods. Group 1*

				Blood Pressure Reaction Period							Pulse Rate Reaction Period					
		Pounds		Test 1,	Test 2,	Incr.	Decr.	Same	Both Over 6 Min.		Test 1,	Test 2,	Incr.	Decr.	Same	Both Over 6 Min.
Case	Age, Yrs.	Gained	Lost	Min.	Min.	+	—	0	?		Min.	Min.	+	—	0	?
1.....	17	9½	..	3	4	+	..	..	..		2½	1	..	—	..	..
2.....	12	1	..	2½	3½	+	..	..	..		2	2½	+	..	..	..
3.....	13	7	..	4	5½	+	..	..	..		2	6+	+	..	..	..
4.....	8	2	..	1½	1½	..	..	0	..		2	2	..	..	0	..
5.....	11	3	..	5	5½	+	..	..	..		6+	6+	..	..	..	?
6.....	15	½	..	2	3	+	..	..	..		1	3½	+	..	..	..
Total	..	23	..	..	...	5	..	1	..		...	...	8	1	1	1
Aver.	12.6	3.8														

TABLE 3.—*Individual Reaction Periods. Group 2*

				Blood Pressure Reaction Period							Pulse Rate Reaction Period					
		Pounds		Test 1,	Test 2,	Incr.	Decr.	Same	Both Over 6 Min.		Test 1,	Test 2,	Incr.	Decr.	Same	Both Over 6 Min.
Case	Age, Yrs.	Gained	Lost	Min.	Min.	+	—	0	?		Min.	Min.	+	—	0	?
1.....	10	½	..	1	2½	+	..	..	..		No incr.	No incr.	..	..	0	..
2.....	8	2½	..	6+	5	..	—	..	..		2½	3	+	..	..	..
3.....	16	10	..	4	3½	..	—	..	..		4	1½	..	—	..	..
4.....	11	....	1	2½	5½	+	..	..	..		2½	4½	+	..	..	..
5.....	12	1½	..	4½	6+	+	..	..	..		1	2	+	..	..	..
6.....	10	½	..	6+	6	..	—	..	..		5½	2½	..	—	..	..
7.....	10	....	2	3½	5½	+	..	..	..		1½	3½	+	..	..	..
8.....	10	1½	..	2½	6+	+	..	..	..		1½	2½	+	..	..	..
9.....	10	3½	..	3½	2½	..	—	..	..		4½	6	+	..	..	..
10.....	11	5	..	5½	5½	..	..	0	..		2	6+	+	..	..	..
11.....	10	....	1½	3	6+	+	..	..	..		2	1	..	—	..	..
12.....	12	....	1½	4	3	..	—	..	..		3½	4	+	..	..	..
13.....	11	2½	..	2½	2½	..	..	0	..		No incr.	1	+	..	..	..
14.....	8	2	..	4	1½	..	—	..	..		5½	1½	..	—	..	..
Total	..	29½	6			6	6	2					9	4	1	
Aver.	10.6	1.6														

TABLE 4.—*Individual Reaction Periods. Group 3*

				Blood Pressure Reaction Period							Pulse Rate Reaction Period					
		Pounds		Test 1,	Test 2,	Incr.	Decr.	Same	Both Over 6 Min.		Test 1,	Test 2,	Incr.	Decr.	Same	Both Over 6 Min.
Case	Age, Yrs.	Gained	Lost	Min.	Min.	+	—	0	?		Min.	Min.	+	—	0	?
1.....	11	1	..	1½	3	+	..	..	..		3	6+	+	..	..	..
2.....	9	3½	..	3	5	+	..	..	..		1	3½	+	..	..	..
3.....	8	1	..	3	4½	+	..	..	..		2	3	+	..	..	..
4.....	7	1	..	4	6+	+	..	..	..		6+	6+	..	..	..	?
5.....	16	4½	..	5	5½	+	..	..	..		6+	2½	..	—	..	..
6.....	10	1½	..	6+	6+	..	..	..	?		1½	4	+	..	..	..
7.....	10	1½	..	6+	4	..	—	..	..		1½	2½	+	..	..	..
8.....	11	3	..	3	6	+	..	..	..		1	No incr.	..	—	..	..
9.....	9	1½	..	6+	4½	..	—	..	..		1½	No incr.	..	—	..	..
Total	..	18½	..	....	....	6	2	..	1		....	....	5	3	..	1
Aver.	10.1	2.0														

tion time is usually longer than in children with normal hearts, and that it is longer still in children with more severely damaged hearts, especially in cases of mitral stenosis.

4. The blood pressure and pulse rate reaction times following a given work test were recorded before the beginning of a period of supervised rest, play and work and again from three to four weeks later. Although the subjects showed obvious general improvement, a comparison of the two sets of reaction periods showed a tendency toward increasing, rather than decreasing, blood pressure and pulse rate reaction periods.

TARSAL SCAPHOIDITIS

(KOEHLER'S DISEASE) *

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NEW YORK

Tarsal scaphoiditis (Koehler's Disease)[1] is rarely mentioned in pediatric textbooks. The literature contains at least sixty-four references to this condition (Alberti).[2] As the disease affects children between the ages of 4 and 9 years, it is of special interest to the pediatrician.

In 1908, Koehler described a hitherto unobserved disease, which occurred in children between the ages of 5 and 9 years. The clinical symptoms are limping, pain, tenderness, swelling and redness over the inner dorsal surface of one foot. A roentgen-ray plate shows definite changes in the scaphoid bone and these changes are similar in all cases. The scaphoid is diminished in size, the outline is irregular, the contour, instead of being clear cut is blurred and irregular and there is a decided increase in density due to an abnormal calcium content. The prognosis is excellent although the length of time for full recovery may be two years. Roentgenograms taken later show a fully and perfectly developed scaphoid. The treatment is immobilization in a plaster cast. In Koehler's original three cases there was no trauma.

This case history follows closely his original description.

REPORT OF CASE

History.—W. P., a boy, aged 5 years, was noticed one afternoon by his nurse while bringing him in from play to be limping. Inquiry developed the fact that his right foot hurt him, and on reaching home distinct swelling, pain, tenderness and redness were present over the inner dorsal surface of the right foot. There had been no injury, although the boy thought that he might have hurt it while climbing a tree. He was put to bed, hot applications were applied and the next day most of the swelling had disappeared. He had a fever of about 102 F., and after four days observation his physician decided that the cause was acute rheumatic fever. This decision was made probably because of an indefinite history of growing pains during the preceding two months and the acute attack

* Received for publication, June 12, 1924.

* From the Department of Pediatrics, Cornell University Medical College.

* The utter fallacy of calling a disease by name is well illustrated in this instance. Koehler has also described another condition affecting the metatarsal bones, which has been tagged with his name. Anyone interested in looking up the literature must bear this in mind as it is likely to lead to confusion.

1. Koehler, A.: Ueber eine häufige bisher anscheinend unbekannte Erkrankung einzelner kindlicher Knochen, München. med. Wchnschr. **37**:2923, 1908.

2. Alberti, O.: La Sindrome safoidea del Kohler, Radiol. med. **9**:233-253, 1922.

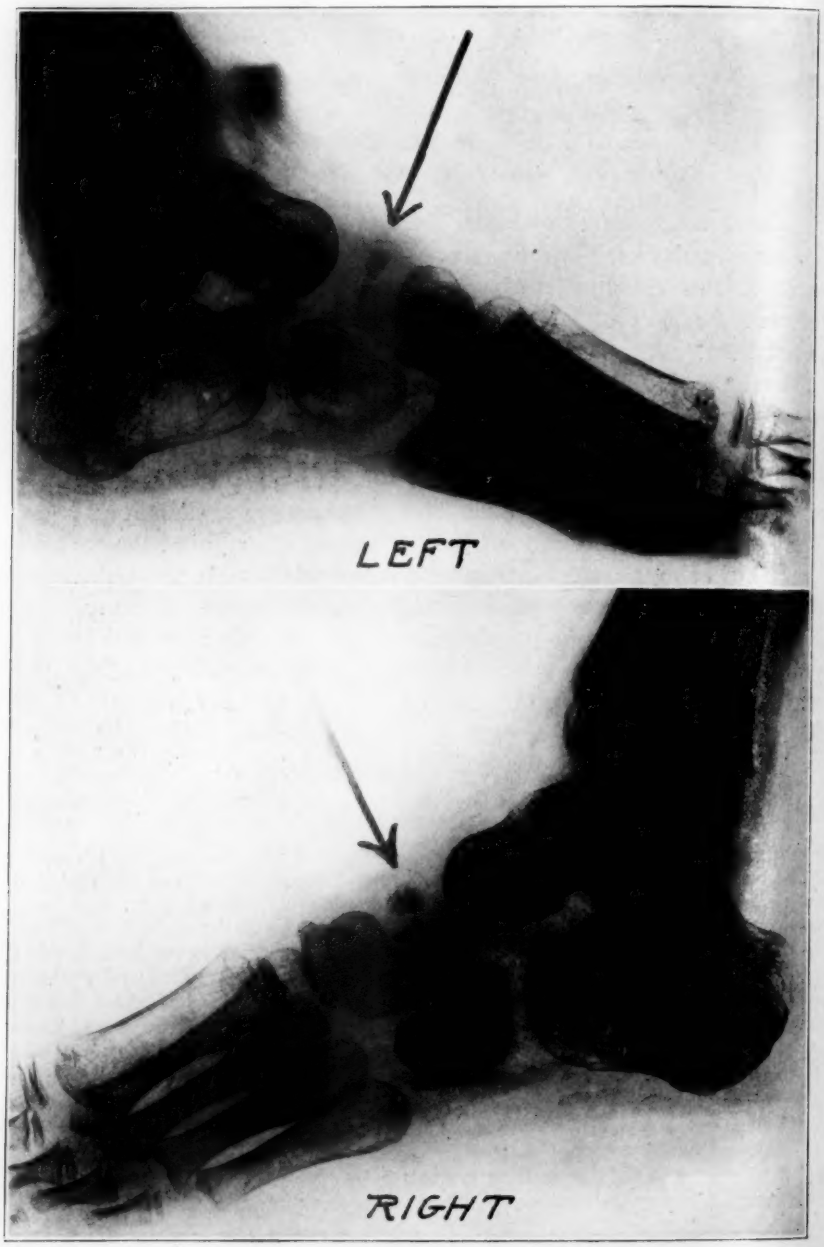

Fig. 1.—Definite changes in the right scaphoid; compare with normal left scaphoid.

involving the right ankle. At this time a soft systolic murmur was present over the pulmonic area, which it was agreed was functional in character. After the patient spent three weeks in bed there was marked improvement, when a recurrence of the symptoms set in. Fortunately these subsided quickly.

For the next four months the boy was kept in bed and not allowed to put any weight on the foot. When seen at this time there was atrophy of the right leg, fulness and tenderness over the dorsum and internal part of the right foot and limitation of extreme dorsal flexion, abduction and adduction. The

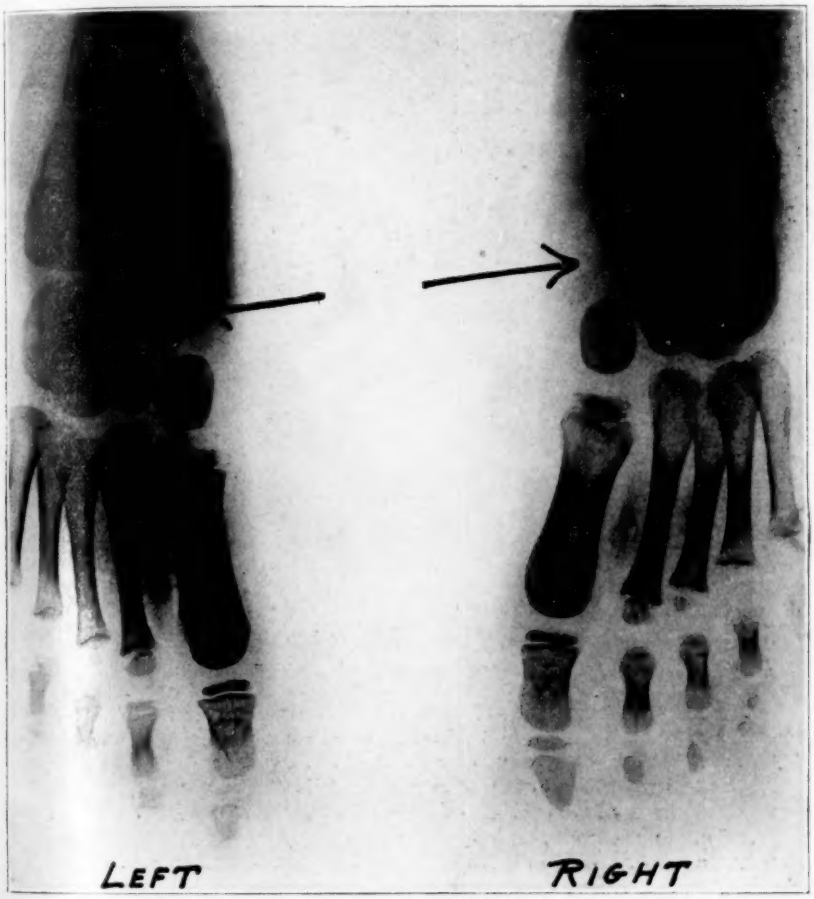

Fig. 2.—Same as Figure 1, anterior view.

physical examination was otherwise entirely negative. It was deemed best to have a roentgen-ray picture taken of the foot, and this showed conclusively the findings described by Koehler (Figs. 1 and 2). The foot was put in plaster and the patient was allowed out of bed. The improvement from then on was rapid, as has been the case with all the cases reported in the literature. A picture taken a year later showed a perfectly developed and normal appearing scaphoid (Fig. 3).

The boy's family history was excellent. His birth and developmental periods were normal. There had been no illness except an occasional coryza accom-

panied by a vomiting spell. He was unusually well developed, being above the average in height, weight and mentality. The Wassermann and Pirquet tests were negative. The blood picture showed no abnormal changes and the serum calcium was 11.5 mg. Roentgen-ray pictures of the hands and patellae showed no abnormalities.

Fig. 3.—The perfectly developed and normal appearing right scaphoid one year later.

ETIOLOGY

Before considering the interpretations which have been offered in explanation of this condition, we must recall that the tarsal scaphoid is the last bone of the foot to ossify. This usually occurs between the age of 3 and 7 years. It is also well to remember that it not infrequently has a bilobed nucleus, and that from its keystone position in the bony framework of the arch it is extremely liable to compression.

Froehlich's [3] admonition, to be extremely careful to make a comparison with the healthy side should be emphasized. He notes that during the period of growth the scaphoid frequently assumes the form considered radiologically as characteristic of Koehler's disease. The double (scaphoideum bipartitum) or even a small accessory nucleus, which may join later to the larger one or remain completely isolated, makes it doubly important in our interpretation of the plates and warrants every bit of the stress which he places on it.

Following Koehler's article case reports began to accumulate. Schultz [4] presented seven cases, and said that they were all compression fractures. During the process of healing the nucleus of the scaphoid decreased, the contour became irregular, the structure blurred and the calcium increased. He claimed that there was a stage in which it could not be distinguished from Koehler's picture. Especially, he noted, if the demolition is small, the greater will the resemblance be to the picture originally described by Koehler.

Koehler's [5] answer to this was very definite, as an examination of the respective titles to their papers will show. He analyzed the twenty-six cases which had thus far been reported, showing that in two-thirds of the cases there had been no history of trauma, that in ten, the changes were bilateral and that in two there were analogous changes in the patellae.

It may be here mentioned that one of the three original cases showed changes in both scaphoids and both patellae. This bilateral element naturally led to the wildest theories as to the origin of the disease, Koehler himself suggesting the possibility of a central nervous pathology. Schultz's explanation of the bilateral cases was that they were simply growth varieties, but Koehler maintained stoutly that while this explanation of the double sided changes was attractive yet it could not account for the clinical picture and added further that, "Every roentgen-ray man of experience knows that, in cases of normal ossification of bone nuclei, there are pictures which show regular divided demolition and condensation which have nothing to do with trauma or are otherwise to be considered pathologic as for instance the trochlear nucleus of the humerus and the nucleus of the calcaneus."

This bilateral element has gradually faded out of the picture, because with an increasing number of cases it has not attracted attention appar-

3. Froehlich: Des apophysites de croissance, Paris méd. **10**:430 (Dec. 4) 1920.

4. Schultz, E. O. P.: Das A. Koehlersche Knochenbild des Os naviculare pedis bei Kindern-, eine Fraktur, Arch. f. klin. Chir. **100**:431.

5. Koehler, A.: Das A. Koehlersche Knochenbild des Os naviculare pedis bei Kindern-, keine Fraktur, Arch. f. klin. Chir. **101**:560, 1913.

ently because it occurs infrequently. It is to be regretted also that many of the case reports have failed to include statements regarding the patellae.

Moffatt [6] offers perhaps the most conclusive evidence that a compression fracture is not always the cause. In one of the four cases reported by him he was fortunate enough to secure a roentgenogram taken immediately after the injury to which the disease was traced. This revealed a foot normal in every respect, thus ruling out a direct compression fracture as the cause of the appearance in the roentgenogram.

Trauma plays an exceedingly interesting and perplexing part. There are very definite reports where a direct injury was the cause but strangely, the disease seldom starts directly after the trauma. McClure [7] had one case which did not show symptoms for six weeks, while Haenisch [8] reports one where a whole year had elapsed before the symptoms showed.

Preiser [9] offers a very ingenious explanation. Drawing an analogy from Kienbock's traumatic softening, following fractures of the semilunar bone, which he believed to be a nutritional disturbance following blood vessel injury, Preiser attributes the tarsal scaphoiditis to compression of that bone, as determined by the condensation in the roentgen-ray plate, leading to injury of the blood vessels and subsequent nutritional disorder in the growing bone.

Fassett [10] thinks that tuberculosis may be responsible for the picture. To accept this view we are to think of the bone as having gone through the stage of repair to the point of cicatrization without having any attention called to it, when suddenly trauma breaks down the sclerosed bone causing pain. The course of the disease, the consistently negative tuberculin tests and the general healthy condition of the great majority of the children reported, make this seem unlikely. This holds equally true for syphilis.

Pfahler [11] and Hetzel [12] agree that the condition is probably an

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6. Moffatt, B. W.: Isolated Disease of the Scaphoid, J. A. M. A. **80**:87-90 (Jan. 13) 1923.

7. McClure, C. R.: Isolated Disease of the Scaphoid, J. A. M. A. **71**:1360 (Oct. 26) 1918.

8. Haenisch, G. F.: Ueber eine häufige bisher anscheinend unbekannte Erkrankung einzelner kindlicher Knochen, München. med. Wchnschr. **55**:2377 (Nov. 17) 1908.

9. Preiser, G.: Zur Frage der typischen traumatischen Ernährungsstörungen der hurzen Hand und Fusswurzelknochen, Fortschr. a. d. Geb. d. Röntgenstrahlen. **17**:360, 1911.

10. Fassett, F. J.: Isolated Disease of the Scaphoid, J. A. M. A. **62**:1155 (April 11) 1914.

11. Pfahler, G. E.: Isolated Disease of the Scaphoid Bone of the Foot in Children (Koehler's Disease), Surg., Gynec. & Obst. **17**:625 (Nov.) 1913.

12. Hetzel, W. B.: Isolated Disease of the Scaphoid Bone of the Foot (Koehler's Disease). Am. J. Orthop. Surg. **15**:214 (March) 1915.

inflammatory osteitis or osteochondritis. The former states that the abrupt appearance and disappearance would suggest rheumatism but no other joints have been involved. Bernstein's [13] case is suggestive of a rheumatic infection. Without a plate one would naturally be inclined to attribute the clinical picture to such an infection, but the roentgen-ray findings, the invariable involvement of the same bone and the absence of infection in other joints should lead us into other channels.

Mouchet and Roederer [14] state that there is no mystery connected with the pathology. Their intensive studies of a series of roentgen-ray plates of one case made them feel sure that they were dealing with a fracture in the beginning, a compression fracture. "But" they add, "If a study of the roentgen-ray plates suggests a fracture, a consideration of the clinical course makes it necessary for us to consider it as a pathologic fracture. Trauma is never constant enough to play an important rôle, but it is probably preceded by a special condition of the bone which we designate as a dystrophy. What the nature of this dystrophy is we do not take it on ourselves to answer entirely. We shall confine ourselves to recalling the analogy that tarsal scaphoiditis presents with the osseous dystrophies seen in adolescence, as coxa vara."

COMMENT

From the numerous cases in the literature it is now possible to draw some definite conclusions. All agree that signs of inflammation are present. The disease occurs in boys in a larger percentage of cases than in girls. The right foot is more often affected than the left though there is not a marked difference. Direct trauma, such as the falling of a weight on the dorsum of the foot is seldom a factor, while indirect trauma, such as jumping from a wagon has little more weight than that usually given to the various bumps and falls which infants and children have.

It is very likely that repeated slight injury, such as occurs from constant jumping and landing full on the flat part of the foot sets up an inflammation in the growing scaphoid, provided there has been some delay in the development of the nucleus of that bone.

There can be no question that direct compression fracture will produce a similar pathologic change, and it would be splitting hairs to deny that they are cases of tarsal scaphoiditis. On the whole, however, the majority of these cases are not caused thus.

With the very definite evidence of an inflammatory process being present, it seems logical, as Mouchet suggests, to call Koehler's disease tarsal scaphoiditis.

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13. Bernstein, B. M.: Case of Koehler's Disease, Am. J. Roentgenol. **9**:518 (Aug.) 1922.

14. Mouchet, A., and Roederer, C.: Le scaphoide tarsienne des jeunes enfants, Rev. d'orthop. **7**:289 (July 1) 1920.

SUMMARY

Tarsal scaphoiditis occurs in children between the ages of 4 and 9 years, and occurs in boys more frequently than in girls. The diagnosis cannot be made without a roentgen-ray examination. The cause may be due to repeated slight trauma to a delayed ossifying center. The symptomology and course is practically the same in all cases and the prognosis is excellent.

REPORT OF A CASE OF HEMOLYTIC JAUNDICE.*

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E. C., a boy, aged 9½ years, was admitted to the Babies' Hospital, Nov. 1, 1921. His appearance arrested attention. He had jaundice and carried himself not unlike a pregnant woman at term.

No history of jaundice in his forbears could be obtained. His father and mother were both strong and well.

There had been one other child who died at the age of 81 days. This infant had apparently been normal at birth. At the age of 10 days, blood was noticed on one nipple. At 11 days, blotches about 1 cm. in diameter were seen on his arms. The mother thought that crops of blotches appeared from time to time until the baby died. The cause of death was not discovered.

Two years after the death of the first child, E. C., the subject of this paper, was born. He was apparently normal at birth. It was noted, however, that his abdomen was large. This enlargement, which in infancy was thought to be due to gas, continued until he was aged 9½ years, when the spleen was removed.

Skin.—For the first two months of life the child had a crop of pin-head sized papules on his face. They were not hemorrhagic. In two months they had entirely disappeared.

Jaundice.—Jaundice was first noticed at about the age of 2 months, and was never absent since that time. It was deepest between the ages of 1 and 5 years. Between 5 and 9 years, the jaundice diminished. The perspiration was always colored. The urine was also highly colored, and after standing over night looked as if it contained blood. The stools varied from normal dark color to light gray.

Fever and Pain.—Attacks of pain in the abdomen associated with fever, often as high as 105, occurred from infancy up to about 6 years of age. In these attacks the jaundice deepened, the appetite was lost, the stools were pale, the urine highly colored, and the glands "in the back of his ears" on both sides were swollen.

Spleen.—The spleen was first discovered enlarged at 4 years of age. The mother thought that it was hard, movable and about the size of her fist.

Hemorrhages.—Were never observed.

Feeding.—He was breast fed for a month.. He gained well on artificial food after that.

Contagious Diseases.—Measles at the age of 5 months.

Development.—He walked at 14 months of age.

Physical Examination.—The general appearance of the child November 8, showed that he looked old for his age. The face was thin; the abdomen portly; postural lordosis was noted; the patient was slightly dyspneic and breathed more easily when sitting up.

Skin.—Lemon tint.

Eyes.—Sclerae moderately jaundiced.

Teeth.—Front upper incisors protruded and widely separated.

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* From the Service of the Babies' Hospital.
* Read before the Thirty-Sixth Annual Session of the American Pediatric Society, Pittsfield, Mass., June 5-7, 1923.

Tonsils.—Buried type. Contained deep crypts.

Lymph Nodes.—Moderately enlarged at the angle of each jaw. No other enlargements.

Heart.—The apex was felt in the fifth interspace in the nipple line. Left border, 8.5 cm. out from midsternal line. A systolic murmur was heard over the entire precordium and also near the spine on the left side. The quality of murmur at the apex was musical. The murmur was heard loudest in the second left interspace. There was a marked venous hum over the vessels of the neck and in the groin. The aortic second sound was louder than the pulmonic second sound. The radial pulse was sharp, strong, full, suggestive of water hammer.[1]

Spleen.—From the intersection of the left mammary line and the lower rib border, a line drawn through the navel to the right border of the spleen measured 14.2 cm.

From the same intersection, a line was drawn to a point 2.5 cm. behind the right anterior-superior spine. The spleen extended 17.3 cm. from left to right along this line. From the same intersection a line continuing the mammary line was drawn to the lower border of the spleen. The measurement was 8.9 cm.

The physical examination was otherwise normal.

Course in Hospital.—November 4, 200 c.c. of blood was transfused from the mother to the child, direct method.

November 5. The patient was in excellent condition. No change in the blood picture following transfusion the previous day (see Table 1).

November 7, transfused 250 c.c. of father's blood.

November 8, splenectomy was performed by Dr. William Downes. The spleen was removed through a 15 cm. hockey stick incision made through the middle of the left rectus muscle. Two supernumerary spleens were found. One was removed for examination. The other, about 6 by 3 cm. in size, was left.

Subsequent History in Hospital.—Two days after the operation the boy was comfortable and happy. The day following the operation the highest temperature was 101.6. He had no further rise of temperature until three weeks later, when he was out of bed, when for three days it fluctuated between 99 and 102. He was discharged from the hospital December 4.

TABLE 1.—*Blood Examination Before Operation*

	Red Blood Cells					
Date	Number	Characteristics	Hemoglobin	Leukocytes	Fragility Tests	Platelets
10/ 7/21*	2,268,000 2,148,000	Megaloblasts 2 Normoblasts 2 Macrocyte... 1 Microcyte.... 1	30% (Talquist)	7,200 Poly.....56% L. lymph.29 S. lymph.10 Trans.... 4 Myelo.... 1	Hemolysis begins at 0.48% and is complete at 0.42% (normally hemolysis is complete at 0.28 to 0.30%)	393,000 480,000 (Done by two different persons)
11/ 2/21	2,450,000	Normoblasts, 11 Achromia, anisocytosis, slight poikilocytosis	43% (Dare)	12,400 Poly.....60% L. lymph. 2 S. lymph.32	.....	.....
11/ 4/21	Transfusion of 200 c.c. mother's blood by direct method					
11/ 5/21	.....	Normoblasts, 11 Achromia, poikilocytosis, slight anisocytosis	45 to 50%	7,500 Poly.....79% L. lymph. 2 S. lymph.19 No abnormal white cells	.....	.....
11/ 7/21, 2:30 p.m. 3:00 p.m.	Transfusion of 250 c.c. father's blood		50%	.....	Increased fragility	
11/ 8/21	Operation, splenectomy					

* Clotting time, from 4½ to 5 minutes.

1. Jan. 21, 1924, two and three-quarters years after this examination, the heart was normal.

TABLE 2.—*Blood Examination After Operation*

Date	Red Blood Cells: Number	Red Blood Cells: Characteristics	Hemoglobin	Leukocytes	Platelets
11/14/21 6 days postoperative	4,240,000	No abnormality of size, shape or color noted; no nucleated forms seen	65% (Talquist)	11,000 Poly.....68.5% Eosin..... 4.5 L. lymph..... 5.5 S. lymph.....13.5 L. monos..... 1.0 Trans..... 7.0 200 cells counted; no abnormal white blood cells	Much increased
11/21/21 13 days postoperative	4,544,000	Appear normal; no nucleated red blood cells seen	85% (Talquist)	14,100 Poly.....61% Eosin..... 1 L. lymph..... 6 S. lymph.....21 L. monos..... 4 Trans..... 6	Increased but not so much as 1 week ago
12/ 3/21 25 days postoperative	4,092,000	Slight anisocytosis and poikilocytosis	65% (Dare) 70 to 75% (Talquist)	15,600 Poly.....45% Eosin..... 6 L. lymph.....15 S. lymph.....19 L. monos.....) Trans.....15	Increased
12/ 4/21, 26 days postoperative. Discharged from hospital					

COMMENT

The rapid disappearance of jaundice was one of the startling events following the operation. Within twenty-four hours the boy's skin and sclerae had returned almost to normal color. Three days after the operation the jaundice had entirely gone. The rapid disappearance of jaundice offers a problem for interpretation. Naegeli [2] comments on having seen the same rapid disappearance of icterus after splenectomy.

The presence of two supernumerary spleens is also a condition of interest. Microscopic sections of the supernumerary spleen showed the same structure as that of the spleen proper.

The blood examination made on December 29, fifty-one days after the operation, offers a third puzzling problem. It showed an increase in the white blood cells to 42,000. The polymorphonuclear cells were only 6.5 per cent., the lymphocytes were 84 per cent. What is the significance of the total increase of white cells? The blood count was made while the boy was in excellent physical condition. Certainly there is no satisfactory explanation for such a large increase in white cells and for such an excess of lymphocytes.

Types.—Two types of hemolytic jaundice are described: The acquired form or Hayem-Widal type, and the congenital or familial form, the Chauffard-Minkowski type.

The patient in this case may best be classified as belonging to the acquired type for the following reasons: No history of family jaundice

2. Naegeli, O.: Blutkrankheiten und Blutdiagnostik, Berlin, 1923, pp.339-346.

could be obtained.[3] The red cells in the acquired type average 2,032,000; in the congenital type 3,340,000. The number of red cells in this case corresponded more with the average found in the acquired form. The acquired type, as described by Widal, shows recurring attacks in which

TABLE 3.—*Subsequent Examinations*

Date	Red Blood Cells: Number	Red Blood Cells: Characteristics	Hemoglobin	Leukocytes	Platelets
12/29/21 51 days postoperative	4,672,000	No abnormality	78% (Dare)	42,000 Poly..... 6.5% Eosin..... 2.0 Baso..... 0.5 S. lymph.....53.0 L. lymph.....31.0 L. monos..... 5.0 Trans..... 2.0	Normal
The enormous increase in lymphocytes was very striking. Most of these cells were fairly large, the nucleus being relatively smaller than in the average lymphocyte. The clear character of the protoplasm and the presence of occasional azurophil granules seemed sufficient to differentiate these cells from large mononuclears. One dividing lymphocyte was seen. (Note by L. E. Holt, Jr.) Patient was in best of health and spirits.					
3/ 8/22 4 mos. postoperative	5,100,000	Appear entirely normal; no nucleated forms seen	95%	11,200 Poly.....45% S. lymph.....38 L. lymph.....11 L. monos..... 1 Trans..... 5 No pathologic cells seen	600,000 (normal 250,000 to 400,000)
A good many of the lymphocytes have an unusually large amount of cytoplasm, as noted in the last examination. No enlargement of cervical, axillary or epitrochlear lymph nodes. The child's condition appears excellent.					
11/17/22 1 year postoperative	5,280,000	Moderate anisocytosis; no nucleated red cells; cells appear normal	87% (Dare)	15,650 Poly.....66% Eosin..... 0 Baso..... 1 S. lymph.....25 L. lymph..... 3 Trans..... 5 No abnormal cells	Diminished
No enlargement of the superficial lymph glands. No trace of jaundice, color excellent. Has grown a great deal since last note (March 8); is robust; plays football.					
1/21/24 3 yr. 2 mo. postoperative	4,332,000	.....	92% (Dare)	8,000 Poly.....51% Eosin..... 1 Lymph.....37 L. monos..... 7 Trans..... 4	
Weight, 94½ pounds (42.6 kg.); height, 56½ inches (142.2 cm.). Looks extremely well. Has never been sick following the operation with exception of an occasional cold. Plays all games and is exceptionally vigorous. He is bright in school (mother's statement). Urine examination. Before splenectomy the urine showed no abnormalities. The urobilin was not in excess. After splenectomy an examination was made (within twenty-four hours) and acetone and diacetic acid were found. The urine was otherwise normal. No quantitative examinations were made. No examination of feces was made.					

the jaundice deepens and bile appears in the urine. He called the attacks "crises of deglobulization." This, of course, is conjecture. The increase of jaundice and the high colored urine are suggestive.

3. The parents are educated people and competent to give accurate information about their family history.

The auto-agglutination test is regarded by Widal and others as an important differentiation of the two types. It is positive in the acquired type and negative in the congenital (familial) type. This test cannot be regarded as definitely established. Unfortunately it was not tried in the case here reported. The fragility of this boy's red blood cells showed only a slight increase above normal[4] (see Table 3, October 7, November 3 and November 5). Naegeli cites instances without any increase in the fragility of the red blood cells.

The increased number of normoblasts found before splenectomy indicated an effort of the bone marrow to compensate for the increased destruction of red blood cells.

The white cell, platelet and differential counts in this case correspond to those recorded by other observers in hemolytic icterus.

Splenectomy has apparently in this case resulted in a cure of the disease. The boy has been transformed into a sturdy, vigorous lad. Previously he was timid and a semi-invalid. It is a matter for conjecture whether there will be a recurrence of the trouble because of the supernumerary spleen which was not removed.

Naegeli speaks of these cases as "constitutional hereditary hemolytic anemia," and, unlike other writers, including Pearce, Krumbhaar and Frazier,[5] does not consider that the acquired type is a clinical entity. He characterizes the red cells as abnormally small, with increased thickness, increased cell volume and abnormally diminished resistance to hypotonic salt solution, while the white cells and the platelets are normal or slightly increased in number. Hyperactivity of the bone marrow, evidenced by the presence of a small number of nucleated red cells, Naegeli regards as an effort to combat the anemia caused by the attempts of the spleen to destroy red cells which are unable to function.

Splenectomy is the treatment par excellence for this disease. The results are brilliant in most instances. The hemoglobin and the red blood cells are often increased the day after operation. The abnormal color of the serum and the increased urobilin in the urine may disappear within twenty-four hours after operation.

PATHOLOGY

Gross Appearance of Spleen.—The spleen removed by operation weighed 1,070 gm., and measured 21.5 cm. long by 13 cm. wide. It was five and one-half times as large as the spleen of a normal adult man, which averages 195 gm. The capsule was smooth, without

4. Normal fragility: Hemolysis starts at 0.48 per cent. and is complete at from 0.28 to 0.30 per cent. In the case here reported, hemolysis began at 0.48 per cent. and was complete at 0.42 per cent.

5. Pearce, R. M.; Krumbhaar, E. B., and Frazier, C. H.: The Spleen and Anemia, Philadelphia, J. B. Lippincott Company, 1918.

adhesions. On the outer surface, near the upper pole, there were dry areas, light gray in color, which Dr. Downes attributed to rubbing of the much enlarged spleen against the abdominal wall, with consequent hyalinization of the covering cells of the splenic capsule. The color of the organ was a uniform, dark bluish red. The vessels at the hilum had been clamped by the surgeon, and had to be tied to preserve the contour of the spleen, since blood ran freely from the vessels when the clamps were loosened. The consistency was soft and there was pitting on pressure. On section, the substance was dark red, soft, but not friable. There was no thickening of the connective tissue septa. On careful inspection no malpighian bodies could be made out.

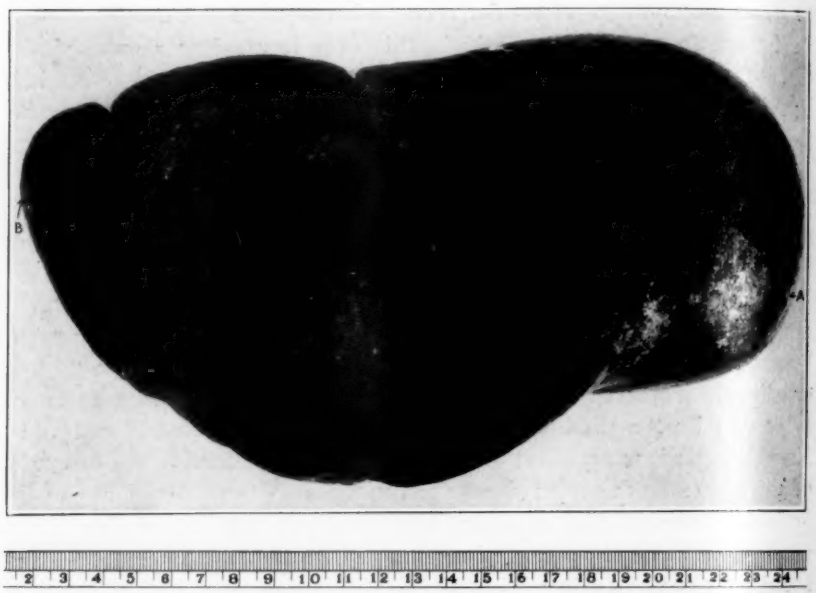

Fig. 1.—Spleen removed by operation. (*a*) Hyalinized area of capsule at upper pole. (*b*) Lower pole.

A supernumerary spleen, measuring 1 by 5 cm., was smooth, kidney shaped, dark blue and rather firm. On section it showed the red color of the larger organ.

Microscopic Examination.—The capsule was of uniform thickness and of the usual fibrous connective tissue character. The septums ramifying from the capsule were not increased in thickness nor in number. The blood sinuses (veins) were large throughout the entire section, largest beneath the capsule. These veins were packed with red blood cells. Their outlines were difficult to trace because they were dilated and anastamosing. In many areas the impression was that of a solid

mass of red blood cells with some pigment granules and an occasional nucleus belonging to a leukocyte or to a splenic pulp cell. Columns of pulp cells were not present, having been pressed out of existence by the dilated venous sinuses. An apparently normal malpighian body was found with a small germinal center and a central artery whose walls were normal. The lymphoid cells were small and not as densely packed

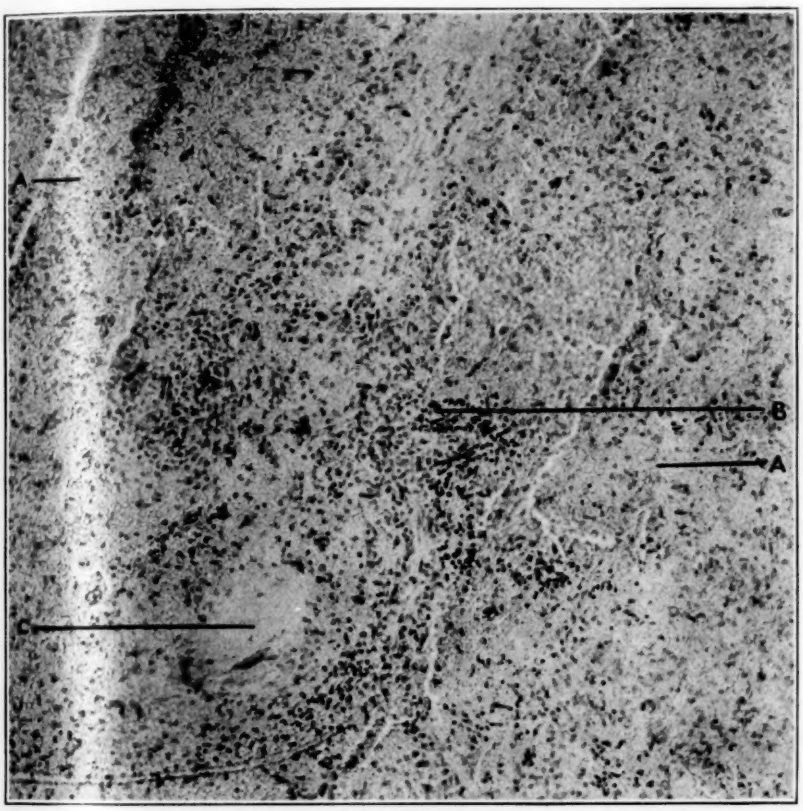

Fig. 2.—Section of spleen showing dilated veins, *a*; small malpighian body, *b*; and connective tissue septum, *c*.

as usual. Throughout the rest of the section there were a few small irregular collections of round cells, evidently the remains of malpighian bodies. In several of them small central vessels could be made out. The outline of these small malpighian bodies was very irregular, and the adenoid cells became less dense and less numerous at the periphery and shaded indefinitely into the surrounding sinuses. With the low power the first impression of the section was simply one of a mass of red blood cells. A few large venous spaces were present around con-

nective tissue trabeculae. They also contained red cells and leukocytes. The red cells could be definitely outlined. They varied somewhat in size; that is, some were apparently microcytes, though most of them were normal in size. Some nucleated red cells could also be made out. The pigment was profusely scattered between the red cells and it was not possible to demonstrate phagocytosis of the pigment.

Fig. 3.—Section of supernumerary spleen showing malpighian body, *a*; dilated veins filled with red blood cells, *b*.

The small supernumerary spleen had the conformation of a lymph node in that nodules were arranged in the cortex with bands of adenoid tissue converging from them toward a hilum. These nodules were not surrounded by lymph sinuses, however, but were arranged around a small artery, thus resembling malpighian bodies, and they had small germinal centers. Between the pulp strands were dilated veins filled

with red cells as in the section of the spleen proper. The capsule was thin, the connective tissue septums were narrow but composed of fibrous connective tissue as in the spleen proper.

It cannot be said that the gross or microscopic study of the spleen adds anything to the elucidation of the symptoms of the case. The increase in the size of the spleen was due entirely to an over-filling of all blood vessels, but especially the venous sinuses in the pulp, with blood cells. The natural effect of this over-distention was to eliminate the pulp cells, by pressing them out of existence. The absence of any evidence of chronic inflammation like thickening of the connective tissue in septums and capsule, or change in the walls of the blood vessels, would argue against the presence of any toxic or infectious irritant. The comparatively large amount of pigment granules gives evidence of the destruction of the red cells. Of the nature of these cells, except their variation in size, we have no evidence.

The pathologic findings in the spleen of fifteen cases of hemolytic jaundice as tabulated by Pearce, Krumbhaar and Frazier were fairly uniform. All but one showed congestion of the pulp, with pigment increase in all but one other. Increased connective tissue was present in only three. Our findings fit well with the picture described by others.

The section of the supernumerary spleen was like that of the large spleen in the presence of its large, dilated venous spaces, but it differed in containing more malpighian bodies, not yet pressed on by the blood spaces.

THE INTRAVENOUS USE OF MERCUROCHROME-220 SOLUBLE IN THE TREATMENT OF PNEUMONIA IN CHILDREN *

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Several years ago a new drug was introduced by Young, White and Swartz [1] for use as a germicide in the genito-urinary tract. Since its introduction this drug, mercurochrome-220 soluble, has found wide fields for employment, both in medicine and in surgery.

Mercurochrome is the sodium salt of dibromoxymercury-fluorescein, made by combining one atom of mercury with one molecule of dibrom-fluorescein and contains about 26 per cent. mercury. It has been shown that in dilutions of 1:5,000 it kills *Staphylococcus aureus* in five minutes and *B. coli* in fifteen minutes. When given intravenously in doses of 0.005 gm. per kilogram of body weight, the resulting dilution with the blood is approximately 1:13,000. Dissolved in defibrinated blood in strengths of 1:8,000 the *Streptococcus hemolyticus* is killed in forty minutes, and when the dilution is made 1:16,000 (well above that occurring with ordinary doses used intravenously) it kills this streptococcus in one hour. It has been shown further that following the use of 0.005 gm. per kilogram of body weight in rabbits there is no change in the red blood cells, white blood cells or differential count. There is no hemolysis and no pathologic findings occur in the urine. Even where 0.007 gm. per kilogram are used every twenty-four hours for three days there is no change in the urine nor any microscopic change in the kidneys. Its use in animals, after artificial septicemia has been induced, has rendered the blood sterile in five hours, and, given a longer period of time, local infections will clear up as well.

It was first used intravenously by Piper,[2] after extensive animal experimentation, on cases of puerperal sepsis. Hill and Colston [3] have

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* From the Department of Diseases of Children, Emory University

1. Young, H. H.; White, E. C., and Swartz, E. O.: A New Germicide for Use in the Genito-Urinary Tract: "Mercurochrome-220," J. A. M. A. **73**:1483 (Nov. 15) 1919.

2. Piper, E. B.: The Treatment of Puerperal Sepsis by the Use of Mercurochrome, with a Report of Animal Experimentation on the Chemical Disinfection of the Blood, Am. J. Obst. & Gynec. 4: **532** (Nov.) 1922.

3. Hill, J. H., and Colston, J. A. C.: A Note on the Bacteriostatic Action of Urine After the Intravenous Administration of Mercurochrome to Normal Rabbits, Bull. Johns Hopkins Hosp. **34**:220 (July) 1923.

shown that, following the intravenous injection of mercurochrome, the urine of rabbits inhibits the growth of *B. coli*. These authors have recently proved that the blood is also bacteriostatic after mercurochrome is injected.[4] In a more recent paper Young and Hill[5] describe the results obtained by the intravenous use of mercurochrome in two cases of sepsis and five cases of severe local infection. They also compare the results obtained by using gentian violet in five cases. Some of their results were almost miraculous.

We had the opportunity of treating a series of cases of bronchopneumonia following an epidemic of measles at the Atlanta Child's Home. One child, desperately ill with extensive bronchopneumonia, multiple abscesses and severe diarrhea was beginning the fifth week of illness. The results obtained by using mercurochrome in this case led us to try it in others, and also to attempt to find some explanation of the mode of action. It was obvious that the drug might rid the blood of any bacteriemia by direct action. This, however, did not explain the results where no bacteria existed in the blood stream. We have therefore advanced the theory that the drug might leave the blood by a process of osmosis and incorporate itself in the lymph and tissue fluids, thereby coming in close contact with the areas of consolidation and the invading organisms. Some such explanation is necessary to explain the marked clinical improvement following the intravenous use of mercurochrome. In support of this theory the following experimental work by us done on dogs is quoted.

PROTOCOL OF EXPERIMENTS

EXPER. 1.—This dog was given 0.005 gm. per kilogram of body weight of mercurochrome-220 soluble in the jugular vein. One hour later it was anesthetized with ether and the lungs were removed. The tissue juices were squeezed out and one drop was mixed with a standard loopful of a twenty-four hour growth of staphylococcus and streptococcus separately. One loopful of each of these mixtures was immediately smeared over a slant of Loeffler's serum and incubated at 37.5 C. (99.5 F.) for twenty-four hours. Controls were used with each bacteria and inoculated on separate tubes of the same mediums. There was a luxuriant growth on the control tubes, while the bacterial suspension of tissue fluids showed only a few scattered colonies.

EXPER. 2.—The experiment was repeated, but in this case blood agar plates were used and colony counts were made after incubation for twenty-four hours. In this experiment the tissue fluids were mixed with known growths of bacteria for five minutes, transferred to a melted blood agar tube and plated. The remainder of the mixture of tissue fluids and bacteria were allowed to stand

4. Hill, J. H., and Colston, J. A. C.: A Note on the Effect of the Intravenous Administration of Mercurochrome on the Bacteriostatic Action of Blood, Bull. Johns Hopkins Hops. **34**:372 (Nov.) 1923.

5. Young, H. H., and Hill, J. H.: The Treatment of Septicemia and Local Infections by Intravenous Injection of Mercurochrome-220 Soluble and of Gentian Violet, J. A. M. A. **82**:669 (March 1) 1924.

fifteen minutes, then inoculated in a blood agar tube and plated. The results recorded in the table show that the tissue fluids of the lungs, after intravenous injection of mercurochrome, are inhibitory to the growth of bacteria.

Results of Experiments on Dogs

Type of Bacteria	Control Plate	After Standing 5 Minutes with Tissue Fluid	After Standing 15 Minutes with Tissue Fluid
Staphylococcus albus	62 colonies	42 colonies	33 colonies
Streptococcus	54 colonies	43 colonies	29 colonies

The question of whether or not mercurochrome is present in the spinal fluid following intravenous injection has been taken up by us. While our results are as yet inconclusive they warrant further investigation, which is now being done and which will be published later.

The technic employed by us was similar to that described by Young. Sufficient quantities of the drug to make a 1 per cent. solution is dissolved in distilled water and filtered. The solution is self sterilizing and should not be heated. In most cases the dose we gave was 0.005 gm. per kilogram of body weight. Larger doses may be given, but in our experience this is seldom necessary to obtain results, and as the reaction is more severe when larger doses are employed we do not advise their use. In most cases the systemic reaction is mild.

A few hours following the injection there is often but not always a rise of 1 or 2 degrees in temperature. There is usually an increase in peristalsis of the intestine, manifested by several large stools. The drug is excreted chiefly by the kidneys and often the urine is pale pink. In certain cases, especially where large doses are used, the drug is also eliminated in the feces; the latter may be colored brilliant red. We have never observed any toxic symptoms from the mercury itself.

From two to four hours after the injection there is usually a rapid fall in temperature. Often this reduction is so sharp that it simulates a crisis. Occasionally, when the decline of fever is not so abrupt, the chart resembles that of a patient with a very sudden lysis. The most striking results, however, are seen in the general appearance of the patient. From the desperately ill child with a respiratory rate of about 60 to the minute, who is often tossing about in extreme restlessness or who lies in a stupor and makes no effort to resist nor shows any sign of pain when the needle is inserted in the vein, there is often a marked change in a few hours. The child appears comfortable and quiet, in such a state seen only after the crisis of pneumonia. We have actually seen this marked clinical improvement several times when there was not any great change in the temperature or pulse rate. In about one-half of our cases a single injection was all that was necessary. In cases where more is required, a second injection may be given safely in twenty-four hours.

REPORT OF CASES

CASE 1.—M. L., a girl, aged 5½ years, white, who weighed 12 kg., developed measles Jan. 29, 1924. This was followed by bronchopneumonia and acute otitis media. She had been ill about six weeks, during which time her temperature had varied from 102 to 105. During the fourth week of illness she developed severe diarrhea, having from five to seven foul stools daily. On the thirty-eighth day of her illness she was in a desperate condition. There were five separate areas of consolidation in the lungs, the temperature was 104.6, she was markedly emaciated, both ears were discharging profusely and she had numerous skin abscesses. The respiration was labored and the patient would become so cyanotic at times that hypodermics of epinephrin were required. Hope for her recovery having been abandoned we decided to try mercurochrome-220 soluble.

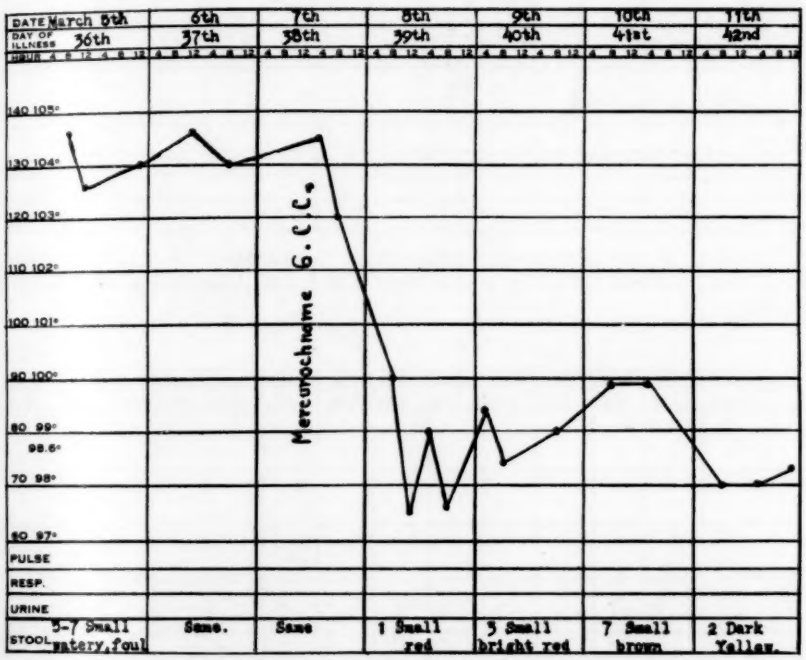


Chart 1 (Case 1).—Extensive bronchonpeumonia. Five separate areas of consolidation, multiple skin abscesses, severe diarrhea and double otitis media.

She was given 0.005 gm. per kilogram of body weight intravenously. There was little or no systemic reaction. The temperature fell as if by crisis, and she began a rapid and uninterrupted recovery. The stools were stained red for two days but the diarrhea rapidly disappeared. The skin lesions improved. We have never seen a more spectacular recovery.

CASE 2.—L. M. W., a girl, aged 6½ years, white, who weighed 14 kg., was first seen March 4. She developed measles one week before, and March 7 the temperature rose to 104, respiration became rapid and labored and cyanosis appeared. The patient was found to have areas of diminished resonance, crepitant râles and bronchial breathing in the right middle and lower lobes. On the fourth day of her illness she received 0.005 gm. of mercurochrome per kilogram of body weight intravenously. The temperature fell from 104 to 99 and the patient appeared greatly improved. The following afternoon the temperature

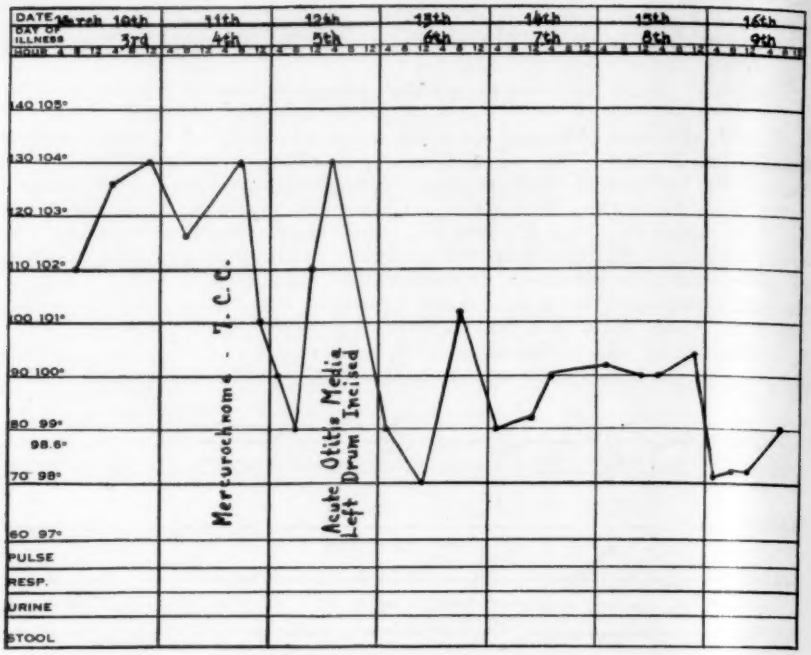
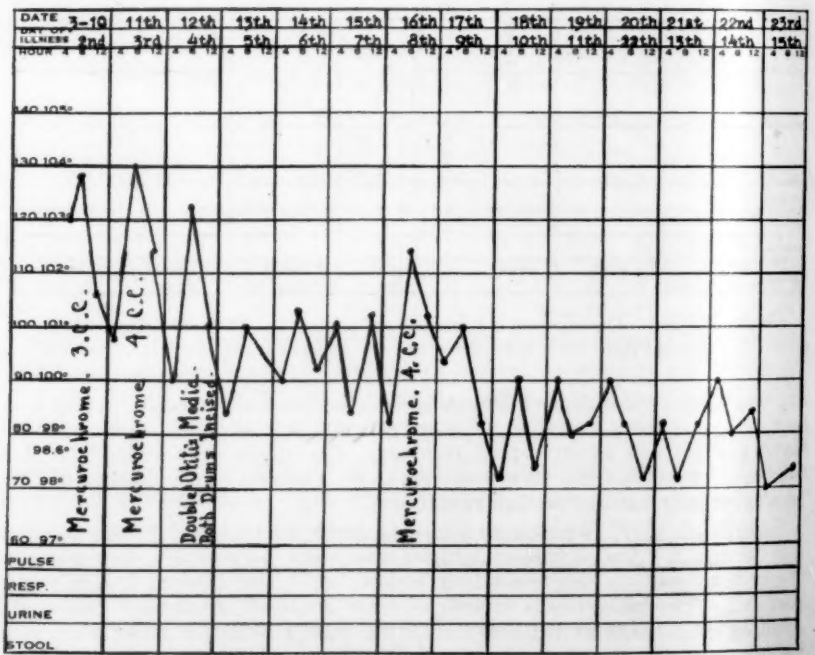


Chart 2 (Case 2).—Bronchopneumonia. Diminished resonance, crepitant râles and bronchial breathing in the right middle and lower lobes. Acute otitis media.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DAY OF ILLNESS 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th
HOUR 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12 4 8 12
140 105°
130 104°
120 103°
110 102°
100 101°
90 100°
80 99°
98.6°
70 98°
60 97°
PULSE
RESP.
URINE
STOOL
3. C. C. Mercurochrome
4 C. C. Mercurochrome
Double Otitis Media - Both Drums Incised
Mercurochrome. 4. C. C.

Chart 3 (Case 3).—Bronchopneumonia. Diminished resonance, moist and crepitant râles and prolonged expiration in the right lower lobe. Acute otitis media.

rose again to 104, and it was found that both ear drums were inflamed. They were incised and the temperature dropped to normal. Three days later the lungs had almost completely cleared. Recovery was rapid and complete.

CASE 3.—R. M., a girl, aged 11 months, white, who weighed 6½ kg., March 9, developed bronchopneumonia following measles. There were scattered areas of consolidation in both lungs, especially in the right lower lobe. The temperature varied between 100 and 104. She received 0.0046 gm. of mercurochrome per kilogram of body weight on the second day of her illness, and on the following day 0.006 gm. After this injection the patient was greatly improved and the temperature fell to 100. It rose again on the following afternoon, and it was found that she had double otitis media. The drums were incised with gratifying results, but on the eighth day the temperature rose to 102.2 and further signs of pneumonia were found. She was again given 0.006 gm. of mercurochrome per

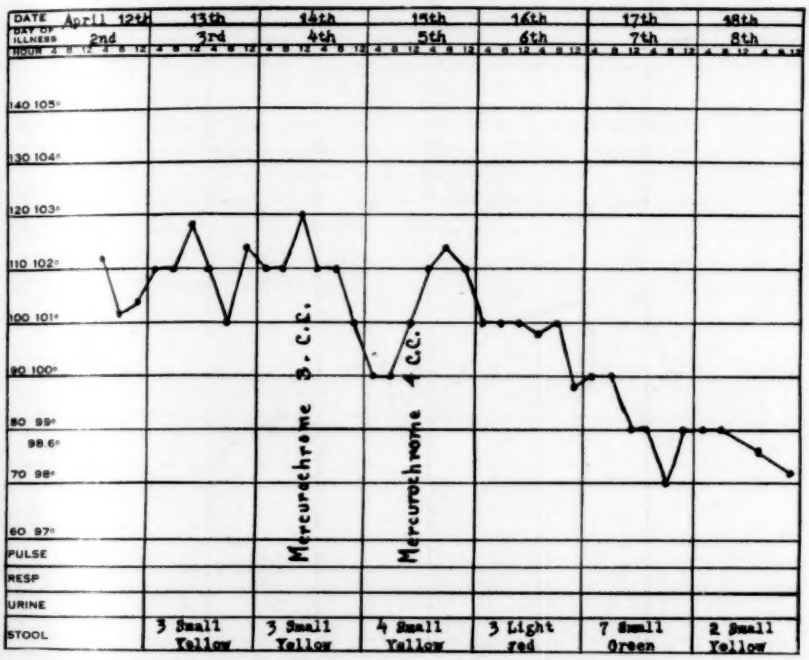

Chart 4 (Case 4).—Lobar pneumonia. Complete consolidation of the right upper lobe. Severe ulcerative stomatitis.

kilogram of body weight, which was followed by a rapid fall in temperature. The lungs quickly cleared. Recovery was complete.

CASE 4.—M. D., a girl, aged 1 year, colored, who weighed 6½ kg., was markedly emaciated. She was admitted to the Grady Hospital on the second day of illness, with lobar pneumonia involving the right upper lobe and a severe ulcerative stomatitis. On the fourth day of illness this infant was extremely ill and almost comatose. She received 0.0046 gm. of mercurochrome per kilogram of body weight. The temperature fell to 100 on the following day and the patient was much brighter but still showed signs of pneumonia. Accordingly she was then given 0.006 gm. of mercurochrome per kilogram of body weight. This was followed by a slight rise in temperature and several red stools. The patient was greatly improved after this injection. The pneumonia resolved rapidly. The stomatitis was apparently not affected.

Case 5.—M. J., a boy, aged 9 months, white, who weighed 8 kg., developed measles complicated by bronchopneumonia. When the patient was seen on the eighth day of illness there was a small area of consolidation in the left lower lobe and many moist and crepitant râles throughout both lungs. Respiration was rapid and grunting in type and cyanosis was marked. He received 0.005 gm. of mercurochrome per kilogram of body weight intravenously. The following day, although there was no marked change in temperature, clinically he was greatly improved. The respiration was much slower and cyanosis had disappeared. Recovery was uneventful.

Case 6.—W. M., a boy, aged 5 years, white, who weighed 16 kg., had been in the Atlanta Child's Home for several years, and had always been slightly cyanotic without any known cause. He developed measles followed by bronchopneumonia. On the eighth day of illness he received 0.005 gm. of mercurochrome

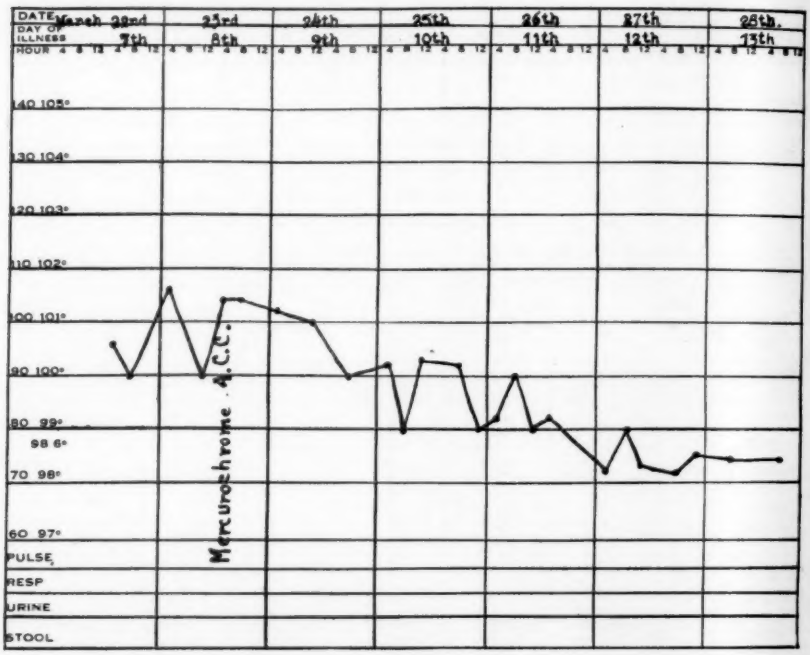

Chart 5 (Case 5).—Bronchopneumonia. Diminished resonance over left lower lobe. Scattered areas of crepitant râles through both lungs.

per kilogram of body weight. The temperature fell and clinically he was much improved. On the twelfth day otitis media developed, which required incision of the drums. The following day the patient was worse and the original dose of mercurochrome was repeated. He continued to be very cyanotic although the temperature was never high. On the fourteenth day he received a third injection of mercurochrome. The physical signs were still that of bronchopneumonia, though not so extensive as at first. The temperature was only 100. However, he continued to grow weaker and it was decided to admit him to the Grady Hospital, where he died three days later. Permission to perform a complete necropsy was not obtained. The lungs were examined and extensive congestion was found. The immediate cause of death was undetermined.

Case 7.—C. C., a boy, aged 6 years, colored, who weighed 19 kg., was admitted to the Grady Hospital with lobar pneumonia involving almost the entire right

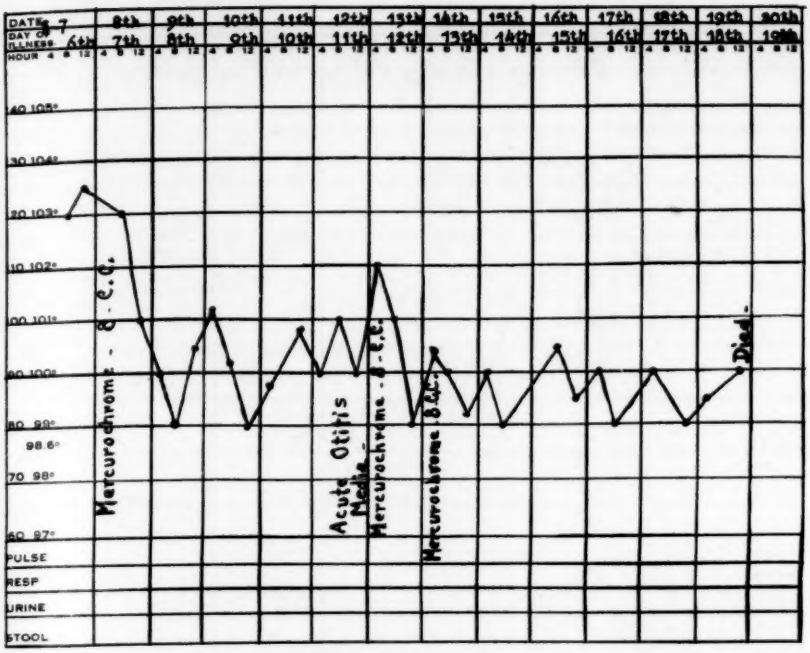

Chart 6 (Case 6).—Bronchopneumonia. Scattered areas of diminished resonance, many moist and crepitant râles through both lungs. Acute otitis media.

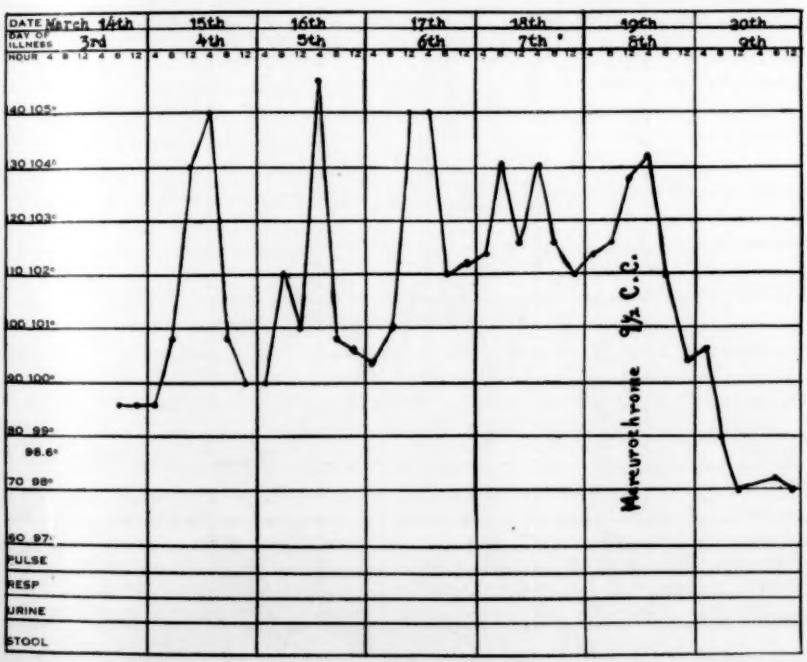

Chart 7 (Case 7).—Lobar pneumonia. Dulness, bronchial breathing and crepitant râles through the entire upper lobe.

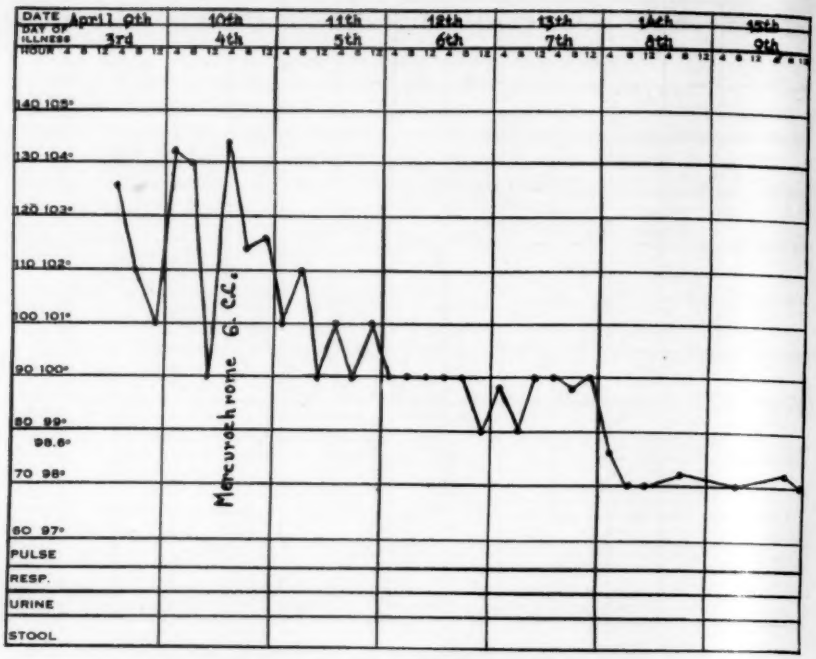

Chart 8 (Case 8).—Consolidated right lower lobe.

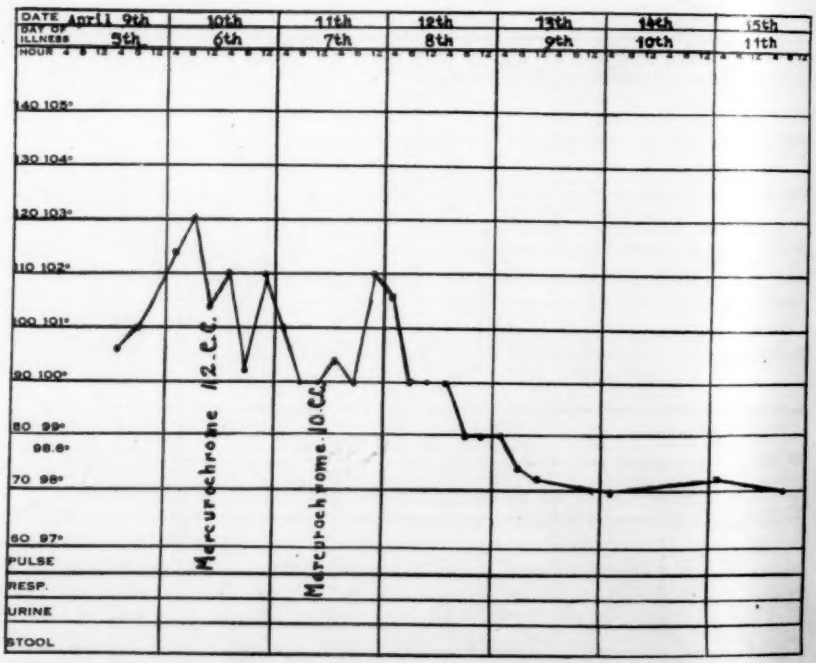

Chart 9 (Case 9).—Lobar pneumonia. Complete consolidation of the right lower lobe. Partial consolidation of the left lower lobe.

upper lobe. The temperature varied from 100 to 105.5. On the eighth day of illness the patient received 0.005 gm. of mercurochrome per kilogram of body weight. This was followed by a slight rise in temperature and a very rapid fall to normal. The change in his general condition following the use of mercurochrome was remarkable. Complete recovery followed rapidly.

Case 8.—J. B., a boy, aged 3 years, colored, who weighed 12 kg., entered the Grady Hospital with lobar pneumonia involving the right lower lobe. The temperature varied from 100 to 104.4. On the fourth day of illness the patient received 0.005 gm. of mercurochrome per kilogram of body weight. The fall in temperature was rapid, and although it remained at 100 for a few days, the breathing was comfortable, the child had lost his anxious expression and he showed marked clinical improvement. Recovery was rapid and complete.

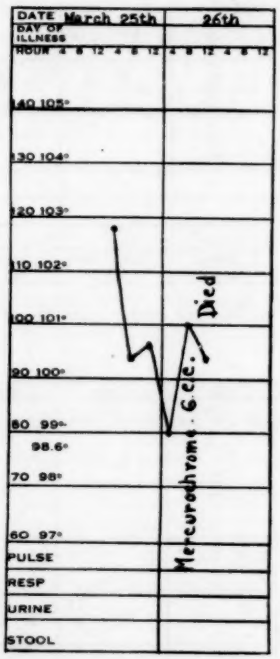

Chart 10 (Case 10).—Bronchopneumina. Many small areas of consolidation through both lungs. Many crepitant and moist râles.

Case 9.—R. B., a boy, aged 8 years, colored, who weighed 24 kg., was treated in the Grady Hospital for lobar pneumonia. On admission, there was complete consolidation of the right lower lobe. On the sixth day of illness he was given 0.005 gm. of mercurochrome per kilogram of body weight intravenously. Before the injection he was very restless. The respiration was 72 to the minute and grunting in type, and the child gave every evidence of being very ill. The following morning there was only a slight change in temperature, but the boy was found sitting up in bed eating an orange. That afternoon he appeared worse and it was then that beginning involvement of the left lower lobe was discovered. He was given 0.0046 gm. of mercurochrome per kilogram of body weight. After a brief rise in temperature, which fell rapidly to normal, the patient was greatly improved and the lungs promptly cleared.

Case 10.—C. C., a boy, aged 5 years, colored, who weighed 19 kg., was admitted to the Grady Hospital with severe bronchopneumonia. On admission

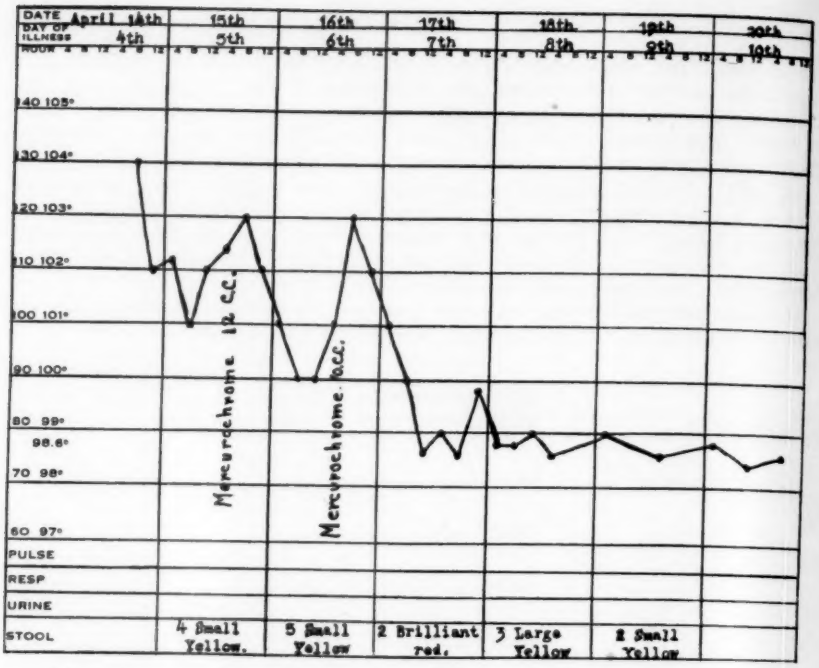

Chart 11 (Case 11).—Complete consolidation of the right lower lobe.

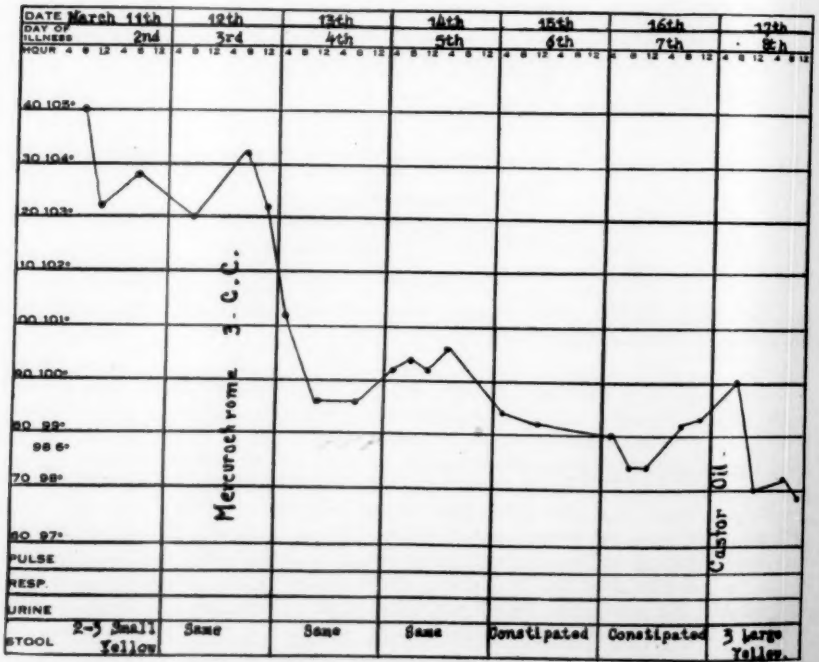

Chart 12 (Case 12).—Bronchopneumonia. Consolidation of the right lower lobe and scattered moist râles through both lungs.

the patient was almost moribund. There were several areas of consolidation and many moist and crepitant râles throughout both lungs. His condition became rapidly worse and though it was quite apparent he was dying, he was given 0.0015 gm. mercurochrome per kilogram of body weight. The dose was without effect and the patient died one hour later.

CASE 11.—T. J. H., a boy, aged 8 years, colored, who weighed 24 kg., was admitted to the Grady Hospital on the fourth day of illness, with lobar pneumonia involving the right lower lobe. The following day the patient received 0.005 gm. of mercurochrome per kilogram of body weight. The temperature fell 3 degrees and the child was much improved. He was given 0.0046 gm. the next day, with marked benefit. The temperature promptly fell to normal, convalescence was uneventful and recovery complete.

CASE 12.—B. M., a girl, aged 8 months, white, who weighed 7.5 kg., developed bronchopneumonia following measles. The temperature varied between 103 and 105, the respiratory rate was 60 and cyanosis was marked. There was a definite area of consolidation in the right lower lobe, and many moist and crepitant râles throughout both lungs. On the third day of illness the patient received 0.0046 gm. of mercurochrome per kilogram of body weight intravenously. The sudden drop in temperature and the rapid recovery, following the use of mercurochrome, in this case was spectacular.

SUMMARY

1. We report twelve cases of pneumonia occurring in infants and children treated by intravenous injection of mercurochrome-220 soluble, together with animal experimentation, showing that following the injection of mercurochrome the fluid squeezed from the lungs inhibits the growth of bacteria.

2. Of the twelve cases of pneumonia, seven were bronchopneumonia and five were lobar in type. Two patients died. In one, death was inevitable before the drug was given. The other case, with cyanosis of unknown origin existing for several years, showed definite improvement at first but later failed to respond to treatment.

3. In seven cases one injection was all that was required. Three cases required two injections and three injections were given in two cases. The average dose was 0.005 gm. per kilogram of body weight, using a 1 per cent. solution.

4. We should like to call attention to the fact that a very marked clinical improvement usually occurs a few hours after the injection, and that this improvement sometimes occurs without any marked change in the temperature or pulse rate.

5. It was our observation that these cases of pneumonia treated with mercurochrome ran a much shorter course than cases of pneumonia of the same severity where this drug was not used.

6. The systemic reaction is mild in children.

CONCLUSIONS

The intravenous use of mercurochrome is of value in treating the pneumonias of infants and children. The results obtained by this drug are often spectacular. The course of the disease is sometimes shortened and often abruptly terminated.

STUDIES ON THE ROENTGEN-RAY TREATMENT OF WHOOPING COUGH *

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AND
LAWRENCE W. SMITH, M.D.
BOSTON

We have attempted to prove in two previous communications [1] that in the roentgen ray we have a therapeutic agent for the treatment of whooping cough which is of definite value, and in our opinion, gives better results than any other single method of treatment. The object of this present paper is to present further evidence, which has been accumulating during the last year, of the beneficial action of this form of therapy.

We are encouraged by seeing in several recent journals that similar studies are being carried on in other parts of the country. Kingston and Faber [2] from California report favorable results in a series of cases. Struthers [3] of Montreal records similar improvement in patients treated by this method. Several personal communications citing individual cases confirm our observations.

We shall endeavor to present the essential facts obtained from an intensive study of twenty cases of uncomplicated whooping cough, followed carefully in the wards of the On Shore Department of The Boston Floating Hospital. Three other cases, complicated by pneumonia, will be discussed separately. In addition, a general survey of the methods of treatment and the interpretation of the roentgen-ray findings will be taken up by one of us (R. D. L.).

The studies for convenience are grouped under various headings. In the first place we have the actual clinical observation of the patient. The cases for study were picked more or less at random from the outpatient clinic, our efforts, however, being aimed at securing as early cases

* Received for publication, June 27, 1924.
* Read before the Thirty-Sixth Annual Meeting of the American Pediatric Society, Pittsfield, Mass., June 5-7, 1924.

1. Bowditch, H. I., and Leonard, R. D.: Preliminary Report on Treatment of Pertussis by Roentgen Ray, Boston M. & S. J. **188**:312 (March 8) 1923 Bowditch, H. I.: Further Notes on the Treatment of Pertussis by the Roentgen Ray, J. A. M. A. **82**:1422 (May 3) 1924.

2. Kingston, J. J., and Faber, H. K.: Notes on X-Ray Treatment of Pertussis, California State J. M. **21**:429 (Oct.) 1923.

3. Struthers, R. R.: X-Ray Treatment of Pertussis, Canad. M. A. J. **14**:141 (Feb.) 1924.

and as young children as possible. As will be noted from the table, eighteen of the twenty patients were aged 3 years or under, and seventeen were within the first three weeks of the disease symptomatically.

This makes the average age of the cases 25.9 months. Eliminating the two older cases the average is reduced to 19.1 months, or just slightly over a year and a half. In the same way the average duration at the time of admission was 2.45 weeks. The series is too small to draw any absolute conclusions as to the relative value of the treatment in the various age groups and in the different stages of the disease. We are forced to turn for this information to the larger outpatient group, which was the basis of our previous report, and in which we

Age Incidence	Cases	*Duration Incidence*	Cases
Under 1 year	6	In 1st week	7
From 1 to 2 years	4	In 2d week	3
From 2 to 3 years	8	In 3d week	7
Over 3 years	2	In 4th and 5th weeks	3
Total	20	Total	20

concluded that the younger patients and the earlier cases seemed to derive the greatest benefit. So too, in the method of treatment no significant facts have been brought out clinically as to the relative value of the various roentgen-ray dosages employed.

EFFECTS OF TREATMENT

The most striking effects of the treatment have been seen in the reduction of the paroxysms. This reduction has been both actual, in the number of whooping attacks, and relative, in a diminution in the severity of the paroxysms. This can be seen by Chart 1. On the day of admission these twenty patients had 288 severe paroxysms. On the fifth day after treatment was started only 157 paroxysms were recorded, and in general they were much less pronounced in severity. By the tenth day this was further reduced to ninety-six, and at the end of two weeks only forty-three paroxysms were noted.

It will be argued, that theoretically the paroxysmal stage of the disease is only of two weeks' duration anyway. In answer to this argument we feel justified in stating that so far as we are able to draw conclusions from the amount of data at hand, the same diminution in the number and severity of the paroxysms occurs whether the disease is at the onset of or later in the paroxysmal stage. This view is thoroughly supported by our observations on the larger groups of cases followed in the outpatient department, now numbering over 500.

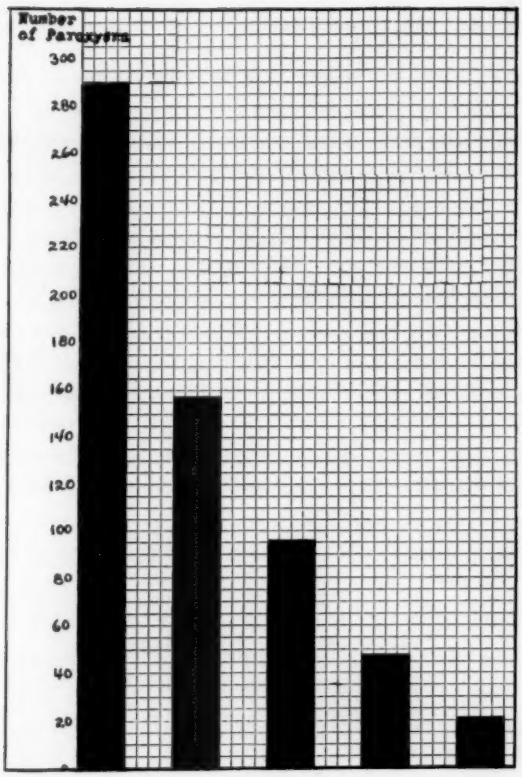

Chart 1.—The effect of roentgen-ray treatment on whooping cough in twenty-one cases.

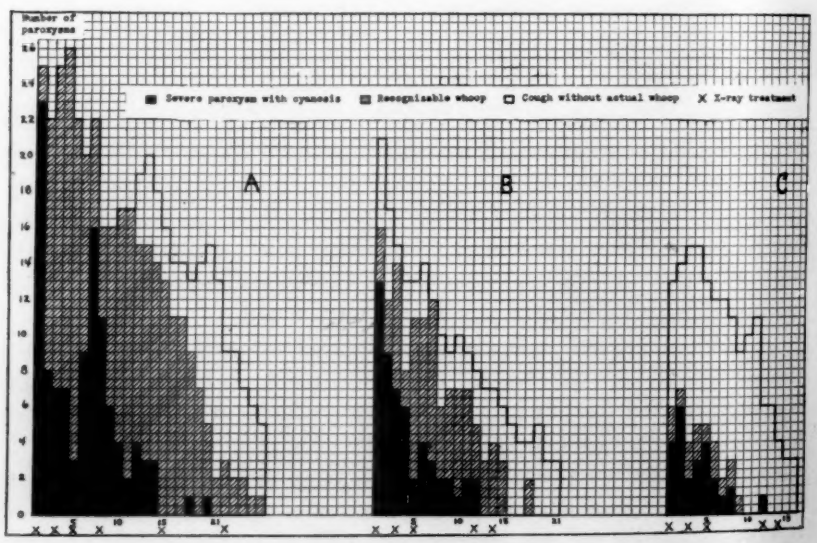

Chart 2.—Case *A*, severe; treatment was started the first week of symptoms. Case *B*, moderate; treatment was started the third week of symptoms. Case *C*, treatment was started the fourth week of symptoms.

To bring out this point Chart 2 is shown to illustrate typical cases. The first of these is that of a boy, aged 4 months, in the first week of the disease. It represents a very severe case. The second is an average case in a girl, aged about 2 years, in the third week of the disease; and the third is a mild case in a girl, aged 3 years, in the fourth week of the disease.

BLOOD FINDINGS

The blood findings in these twenty cases at the time of admission are represented in Chart 3. This gives a fairly representative picture

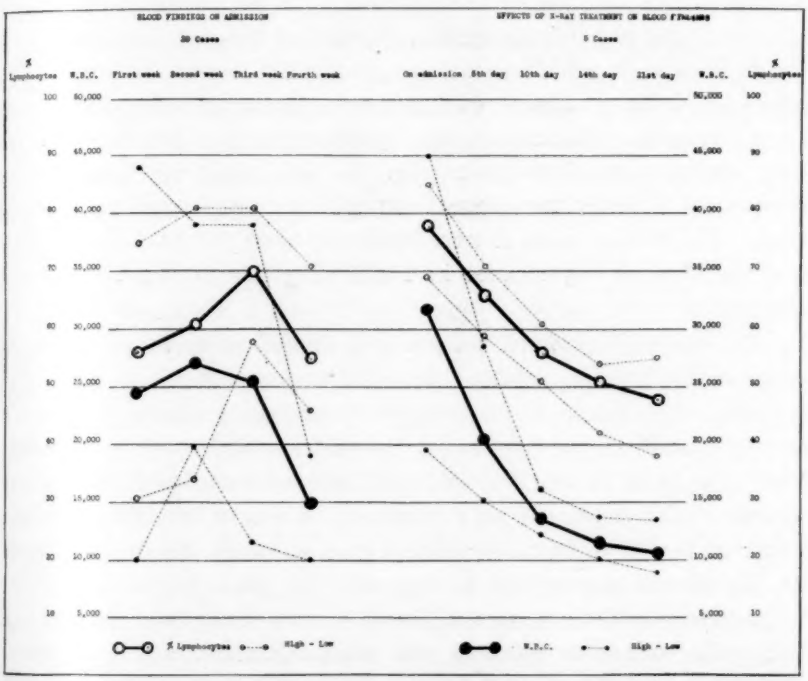

Chart 3.—The striking effect of roentgen-ray treatment on the blood in whooping cough.

of the normal variations in the actual number of white cells, and the differential lymphocyte count over the first four weeks of the disease, as the extremes are indicated by dotted lines. It suggests that there is an initial lymphocytosis which reaches its maximum at the third week and then drops gradually back to normal.

The effects of roentgen-ray treatment on the blood picture is recorded in the parallel chart. This has been obtained by following the blood count every few days in a small group of cases. While the

series is too small to make any didactic statement, we feel that the blood picture roughly parallels the clinical improvement. In the outpatient group similar blood counts and smears have been made in a large series of cases at weekly intervals, and the same drop in total white cells and in the relative preponderance of lymphocytes has been noted.

BACTERIOLOGY

In six, or 30 per cent., of the series of house cases, cultures have been positive for *Bacillus pertussis*. The method of procedure has been to attempt to isolate the organism according to the method of Povitzky[4] on blood agar plates from sputum obtained at the end of a paroxysm. In those cases in which suitable sputum could not be obtained, or in which preliminary cultures were negative, further cultures were made from laryngeal specimens obtained by laryngoscopy. Four of the positive cultures were from patients in the first or second week of the disease. The other two were from patients just entering the third week. No positive cultures were obtainable after the third week, which may be of some significance in establishing any arbitrary period of quarantine.

The bacteriologic work has not been carried on so far as we might wish at the present writing. It is extremely difficult to grow the organisms readily on the ordinary mediums and get them in a usable form for serologic investigation. However, animals have been immunized with both A and B types, and agglutination experiments of the various strains isolated by us performed. We have been able to secure a titer of 1:400 in the case of the A type, and of 1:800 of the B type. So far, all our strains have corresponded to the B type.

A few complement deviation experiments have been carried on. The preliminary work was restricted to animals immunized by the stock strains. It was found that in accord with Bordet's[5] original report there was a specific fixation of the complement with serum immunized by inoculation with *B. pertussis*. Our next step was the immunization of rabbits with strains of the organism isolated from our cases. In the five strains used a positive result was obtained. Following the animal experiments, the serum of active cases of whooping cough has been used. Thus far the results suggest that there is a specific antibody

4. Povitzky, O. R.: Improved Methods for Isolation and Later Cultivation of *B. pertussis*, J. Infect. Dis. **32**:8 (Jan.) 1923.

5. Bordet, J., and Gengou, O.: Le microbe de la coqueluche, Ann. de l'Inst. Pasteur **20**:731, 1906.

produced during the disease, as we have obtained positive results in five cases in the fourth and fifth weeks. Our efforts are now being aimed at attempting to find out how early in the disease this reaction occurs in the serum and how long it lasts. In two cases in the second week negative results were noted, and in two cases three months after the disease was over, the results were unsatisfactory. One of these was definitely negative, and the other yielded a doubtful positive. In view of the fact that, clinically, the immunity following whooping cough is permanent, it seems as if certain permanent changes in the serum should occur.

The original idea in undertaking these laboratory investigations was to find some useful method of establishing an early diagnosis, and to develop if possible some practical method of treatment by recognized biologic methods. We still feel that such a method can be reached ultimately, and our efforts are aimed in part at maintaining interest among pediatricians and laboratory workers in this distressing disease, that this end may be attained as soon as possible.

COMPLICATIONS

In the foregoing, reference was made to three cases complicated by bronchopneumonia. Two of these were in infants under 1 year of age. One of them had a very severe infection, the other less so. The chief point of interest in these cases is in the supplementary forms of treatment used. The same relief from the paroxysms was noted following the use of the roentgen ray. This in itself we feel is the chief factor in effecting a cure, for by conserving the strength of the baby in this manner his resistance must be considerably heightened. In addition we have been using physiotherapy in the form of diathermy. A recent German article [6] reports favorable results in the treatment of whooping cough by this method. The literature abounds with papers concerning its use in pneumonia in adults. This seems to be one of the lessons in therapeutics which the war taught us. It seemed to us accordingly well worth while to combine these forms of therapy in these complicated cases. The third case was in a girl, aged 3 years, who had a diffuse process at both bases, which roentgenologically suggested a bronchiectasis. Under the combined form of treatment she regained 7 pounds (3.2 kg.) in about six weeks and the chest condition cleared up both clinically and roentgenologically, although we all felt that if she did not die she would be left with permanent lung changes.

6. Kleinschmidt, K.: Treatment of Pertussis by Diathermy, Med. Klin. **16:** 1206 (Nov. 21) 1920.

SUMMARY

At the present time, therefore, our methods of treatment may be summarized as follows: (1) In exposed cases the use of pertussis vaccine may be considered as probably from 85 to 90 per cent. efficient in preventing the disease; (2) In active cases the use of the roentgen ray, as will be outlined by one of us (R. D. L.), supplemented by diathermy and medication as indicated, particularly in those cases complicated by bronchopneumonia, gives us a valuable weapon in the treatment of the disease.

THE EFFECT OF THE ROUTINE ADMINISTRATION OF COD LIVER OIL ON THE DEVELOPMENT OF RICKETS IN THE BREAST FED*

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NEW ORLEANS

In a previous study it was shown that the clinical symptoms attributed to rickets existed in varying degrees during the first year in breast fed babies, in terms of plusses from one to nine for the combined symptoms. In only three instances was there 1 +, the other instances ranging from 2 to 9. The symptoms studied were costal beading, enlarged epiphyses, cranial bosses, flaring ribs, craniotabes, and bow-legs. The frequency of their incidence was in the order named. Bow-legs were negligible. No attempt was made in the study to correlate the serologic and radiologic findings. The previous study included 197 cases, of which sixty-two were white and 135 were colored.

In the present study the observations were conducted in the same manner exactly, the readings made by one of us and checked by the other. With the previous study as a control, observations in this study were conducted to show the effect of cod liver oil on the development of rickets as determined by the clinical symptoms of the disease. At the first visit to the outpatient division of the service of the newly born, each baby was prescribed one-half teaspoon of an emulsion of cod liver oil, to be given three times a day. The cod liver oil was pure Norweigian cod liver oil obtained in the open market. This first visit was on the Thursday nearest which the infant was 4 weeks old, observations were recorded in terms of plusses on each of the symptoms and were graded from plus-minus which indicated a doubtful to three or four plusses depending on the severity of the symptom for each symptom at each visit. These visits were at four week intervals.

The study covered a period of one year (twelve calendar months) as did the previous study, beginning with the month of October 1922, and ending with the month of September 1923. In this way all seasons were included. Only breast fed infants were studied. This does not mean that infants were continued on the breast exclusively throughout the year if the supply was deficient, but the breast milk was utilized exclusively whenever possible and in those cases where the milk was insufficient to meet the baby's requirements, as evidenced by clinical

* Received for publication, July 2, 1924.
* From the Service of the Newly Born, Touro Infirmary, and the Department of Pediatrics, School of Medicine, Tulane University of Louisiana.
* Read before the Thirty-Sixth Annual Meeting of the American Pediatric Society, Pittsfield, Mass., June 5-7, 1924.

manifestations and confirmed by weighing before and after nursing, complemental feedings of modified cow's milk were given. As the baby became older other foods were added, as in the previous study. As a rule, cereal jellies and toast were begun when the baby was 6 months old, or when its weight was 15 pounds (6.8 kg.). Orange juice was begun on the first visit to the outpatient division. Broths were begun at about the ninth month, and strained vegetables toward the end of the year. Of the white mothers 86.8 per cent. were able to nurse their babies exclusively for three months, and 30.4 per cent. were able to nurse their babies exclusively for six months; 88.8 per cent. of the colored mothers were able to nurse their babies for three months, and 35.5 per cent. were able to nurse their babies for six months. In this study about 10 per cent. more of each the white and colored mothers nursed their babies for three months, while about the same number as in the previous study nursed their babies for six months.

The diets of the mothers were not restricted. Fruits and vegetables in season, peas, beans, and meats constituted the major part of the dietary, this, of course, being influenced by the family income.

Hygienic measures other than those having to do with feeding, including airing, bathing, exercise, clothing, and rest were advised, and in many instances the cases were referred to the special social service worker assigned to the service of the newly born for investigation and supervision. This was probably more frequently done than in the previous study. This is of especial interest in view of the relatively greater intensity of the clinical symptoms in this study as compared with the former study.

One hundred and ninety-one infants were included in this study, seventy-two white and 119 colored. Of the white babies 27.7 per cent. were first born, 23.6 per cent. were second born, and the remaining ranged from the third to the ninth born. In the colored, 28.5 per cent. were first born and 19.2 per cent. were the second born and the remaining ranged from the third to the tenth born.

There was no more syphilis in this than in the previous study, as evidenced either by clinical manifestations of the disease or by serologic examination.

The monthly meteorologic summary, shown in Table 1, is of especial interest. During the period of this study the percentage of possible sunshine, while it was two degrees more than the normal average, was 1.9 or nearly 2 degrees less than in the previous study. The average temperature, the atmospheric pressure, and the humidity were practically the same as in the previous study, but the amount of precipitation for the year was considerably more than the normal average, being 63.70 inches against the normal average of 57.42 inches or 6.28 inches above the normal. In the previous study the precipitation was less than the

normal average by 4.23 inches. The difference in the precipitation for the period of this study was 10.91 inches more than the precipitation for the period of the previous study. This seems very significant especially when combined with the diminished sunshine, as probably explaining the greater intensity of the rickets in this study, in spite of the administration of cod liver oil. Table 2 is also of interest in showing further the influence of sunshine on the peak. In the column showing the percentage

TABLE 1.—*Monthly Meteorological Summary*

	Possible Sunshine		Percentage of Temperature		Atmospheric Pressure			Precipitation Inches		Humidity			
						Since 1871				In Study		Normal Average	
	Average in Study	Average 1891-1916	Average in Study	Average 1891-1916	Mean in Study	Highest	Lowest	Total per Month in Study	Normal	7 a.m.	7 p.m.	7 a.m.	7 p.m.
October....	69	64	71.6	71.0	29.94	30.55	29.21	3.25	2.98	77	68	80	72
November..	61	55	66.5	61.6	30.12	30.68	29.47	3.38	3.79	78	68	82	74
December..	54	45	63.5	55.6	30.11	30.71	29.55	7.01	4.46	90	81	82	75
January...	66	48	61.0	54.2	30.16	30.80	29.27	5.26	4.63	85	71	82	74
February..	53	49	57.0	57.3	30.20	30.71	29.13	2.33	4.47	85	70	82	73
March.....	51	57	61.6	62.8	30.09	30.71	29.55	4.56	5.30	80	69	82	73
April.....	61	59	69.8	68.8	29.99	30.48	29.44	4.48	4.91	81	66	82	71
May.....	69	64	74.3	75.4	29.87	30.38	29.62	9.10	3.88	85	72	81	71
June.....	56	61	79.9	80.6	29.97	30.34	29.63	5.38	6.16	86	77	81	75
July.....	46	53	80.2	82.4	30.01	30.29	29.41	8.72	6.47	87	78	82	76
August.....	49	55	82.0	82.2	30.01	30.29	29.43	7.60	5.61	86	80	82	77
September.	73	61	81.2	79.2	30.01	30.21	28.11	2.63	4.81	80	68	82	75
Average for year.....	59	57	70.7	69.0	30.04	30.52	28.39	63.70*	57.42*	83	72	82	74

* Total for year.

TABLE 2.—*Actual and Possible Hours of Sunshine*

1921-1922, Month	Per Cent. Possible Sunshine	Actual No. Hours of Sunshine	1922-1923, Month	Per Cent. Possible Sunshine	Actual No. Hours of Sunshine
October.....	88	314	October.....	69	243.8
November.....	64	205.5	November.....	61	194
December.....	57	181.7	December.....	54	174.4
January.....	36	116.2	January.....	66	208.3
February.....	49	152.9	February.....	53	164.7
March.....	62	228.9	March.....	51	190.4
April.....	61	237.9	April.....	61	235.5
May.....	54	228.6	May.....	69	290
June.....	57	242	June.....	56	236.8
July.....	63	268	July.....	46	197.5
August.....	70	286.7	August.....	49	200.2
September.....	70	259.3	September.....	73	269.3
Average.....	60.9	2,721.7*	Average.....	59	2,604.9*

* Total for year.

of possible sunshine and the actual number of hours of sunshine for the period of the first study, namely, October 1921, to September 1922, it will be seen that the least possible sunshine was in the period of January and February, at the period when rickets probably develop most rapidly. This immediately preceded the peak of the intensity of rickets in the previous study which occurred in March. In the column for the period of this study, namely, October 1922, to September 1923, there was a good amount of possible sunshine and also an actual number of hours of sunshine in the months of January and February, but

in July and in August the percentage of possible sunshine was at its minimum for the year. The number of hours of actual sunshine for that time of the year was consequently very low. This is of especial interest, as the peak of maximum rickets in this study occurred in the month of July. During this month also the average temperature for the month was less than the normal average, whereas in the previous study the reverse was the case for the same months. The precipitation for the months of July and August was more than for any two con-

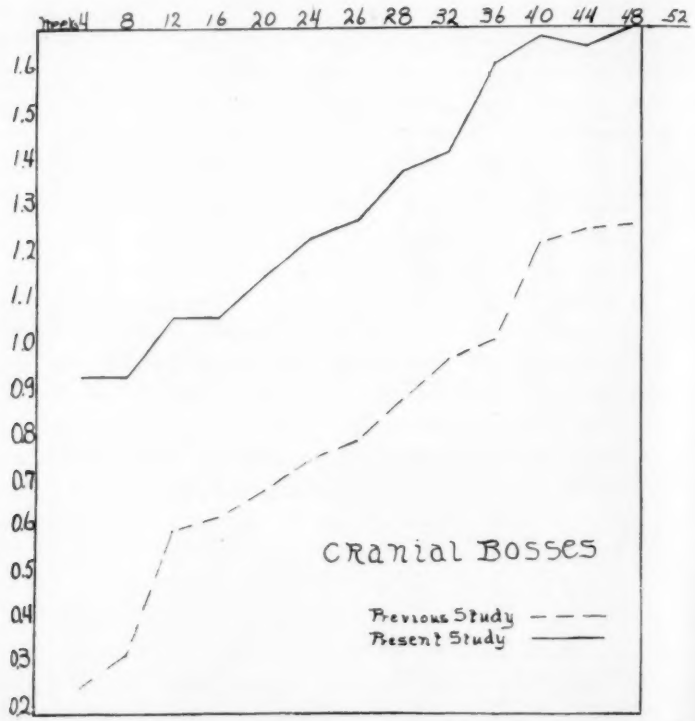

Chart 1.—Cranial bosses, showing average intensity in both studies, a comparison.

secutive months in this study, and the increase in precipitation for the month of July 1923 over July 1922 was more than the increase in precipitation for the month of March 1922 over March 1923.

Incidentally there were 116.8 hours less of actual sunshine during the period of this study.

Of the 191 babies studied, the plus readings ranged from 2+ to 8+ in the combined symptoms in the white, and from 1½+ to 12+ in the colored.

None of the individual clinical symptoms appeared to have a seasonal peak. The peak, as determined by the greatest number of

plus readings of all the clinical symptoms, based on a four week period, occurred in the month of July with the height of the peak being about July 26.

The clinical symptoms were more marked during this study than during the preceding one, with the exception of costal beading and enlarged epiphyses.

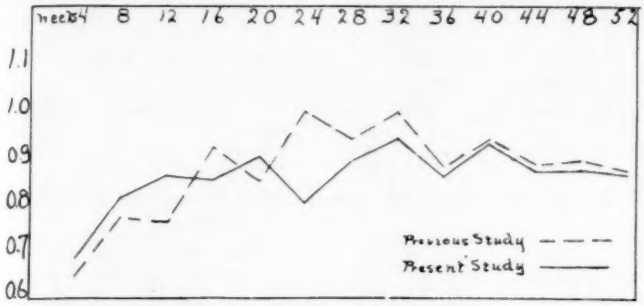

Chart 2.—Costal beading, showing average intensity in both studies, a comparison.

Cranial bosses was the most frequent symptom, occurring in 97.2 per cent. of the white and 96.6 per cent. of the colored children, with a general average of 96.8 per cent. for the entire study. It was first noted as early as the fourth week and was first noted as late as the

TABLE 3.—*Frequency of Symptoms of Cranial Bosses*

Previous Study without Cod Liver Oil		Present Study with Cod Liver Oil	
White	68.63	White	97.2
Colored	75.27	Colored	96.6
Average	72.8	Average	96.8

Average Intensity Cranial Bosses, Previous Study without Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.29	0.38	0.74	0.72	0.79	0.83	0.95	0.98	1.12	1.12	1.5	1.52	1.59
White	0.22	0.27	0.43	0.48	0.52	0.67	0.64	0.74	0.76	0.79	0.91	0.95	0.88
Average	0.26	0.33	0.60	0.63	0.69	0.76	0.80	0.89	0.98	1.02	1.23	1.26	1.27

Average Intensity Cranial Bosses, Present Study with Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.9	0.99	1.16	1.09	1.18	1.22	1.31	1.41	1.48	1.78	1.72	1.75	1.70
White	1.08	0.86	0.92	1.05	1.13	1.27	1.27	1.41	1.36	1.47	1.64	1.60	1.72
Average	0.94	0.94	1.07	1.07	1.16	1.24	1.28	1.39	1.43	1.62	1.68	1.66	1.70

In Chart 1 and in the following ones, the figures according to weeks represent the average intensity of the symptom recorded in the amount of plus readings.

fifty-second week in the white. In the colored it was also first noted as early as the fourth week but it was also first noted as late as the thirty-second week.

Table 3 shows the average intensity of this symptom recorded every fourth week during the period of the first study, and the same information for the period of this study permitting of a comparison.

Costal beading was the next most frequent symptom. It occurred in 95.8 per cent. of the white and 95.7 per cent. of the colored children with a general average of 95.8 per cent. for the entire study. In the white children it was first noted as early as the fourth week and it was first noted also as late as the fortieth week. In the colored children it was also first noted as early as the fourth week, and also was first noted as late as the twenty-eighth week.

TABLE 4.—*Frequency of Symptom of Costal Beading*

Previous Study without Cod Liver Oil		Present Study with Cod Liver Oil	
White	97.0	White	95.8
Colored	98.9	Colored	95.7
Average	98.1	Average	95.8

Average Intensity Beading, Previous Study without Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.62	0.8	0.88	1.0	0.86	1.04	1.01	1.02	0.94	1.0	0.96	0.97	0.97
White	0.67	0.76	0.65	0.81	0.86	1.0	0.8	1.0	0.81	0.85	0.8	0.82	0.78
Average	0.65	0.78	0.77	0.98	0.86	1.01	0.95	1.01	0.89	0.95	0.895	0.9	0.88

Average Intensity Beading, Present Study with Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.68	0.87	0.93	0.87	0.96	0.87	1.03	1.13	0.96	1.09	1.04	1.0	0.80
White	0.70	0.75	0.78	0.85	0.83	0.75	0.71	0.71	0.79	0.80	0.76	0.8	0.83
Average	0.69	0.82	0.87	0.86	0.91	0.81	0.90	0.95	0.87	0.94	0.88	0.88	0.87

TABLE 5.—*Frequency of Symptom of Epiphyseal Enlargement*

Previous Study without Cod Liver Oil		Present Study with Cod Liver Oil	
White	84.0	White	87.5
Colored	87.1	Colored	84.8
Average	86.1	Average	85.8

Average Intensity Enlarged Epiphyses, Previous Study without Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.09	0.27	0.44	0.68	0.73	0.92	0.8	0.85	0.84	0.96	0.74	0.87	1.05
White	0.03	0.22	0.35	1.03	0.65	0.58	0.8	0.68	0.7	0.72	0.68	0.55	0.73
Average	0.07	0.25	0.4	0.9	0.69	0.77	0.8	0.79	0.84	0.87	0.71	0.73	0.93

Average Intensity Enlarged Epiphyses, Present Study with Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.1	0.27	0.47	0.6	0.65	0.71	0.76	0.8	0.56	0.88	0.77	0.75	0.70
White	0.11	0.28	0.38	0.51	0.56	0.44	0.43	0.67	0.50	0.54	0.56	0.65	0.65
Average	0.10	0.28	0.45	0.57	0.62	0.60	0.63	0.74	0.52	0.72	0.65	0.68	0.66

Table 4 shows the average intensity of this symptom recorded every fourth week throughout the periods of both studies, permitting a comparison.

Epiphyseal enlargement was the third in frequency occurring in 87.5 per cent. of the white and 84.8 per cent. of the colored children with a total average of 85.8 per cent. for the study. It was first noted

in the white children as early as the fourth week, and it was also first noted as late as the fortieth week; and in the colored children it was also first noted as early as the fourth week but it was first noted as late as the thirty-second week.

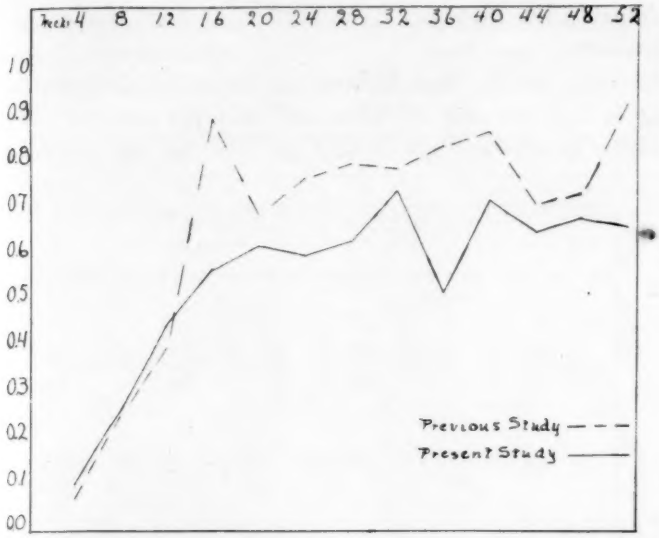

Chart 3.—Epiphyseal enlargement, showing average intensity in both studies, a comparison.

TABLE 6.—*Frequency of Symptom of Flaring Ribs*

Previous Study without Cod Liver Oil		Present Study with Cod Liver Oil	
White	62.58	White	84.7
Colored	78.04	Colored	79.7
Average	72.4	Average	81.6

Average Intensity Flaring Ribs, Previous Study without Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.07	0.16	0.25	0.23	0.74	0.75	0.76	0.84	0.82	1.02	1.36	1.27	0.83
White	0.04	0.1	0.19	0.18	0.14	0.3	0.32	0.61	0.35	0.56	0.64	0.37	0.34
Average	0.06	0.14	0.22	0.21	0.55	0.58	0.59	0.75	0.63	0.84	1.0	0.93	0.53

Average Intensity Flaring Ribs, Present Study with Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.26	0.34	0.55	0.53	0.83	0.72	0.82	0.95	0.92	0.95	1.15	0.87	0.90
White	0.17	0.17	0.47	0.60	0.52	0.50	0.67	0.83	0.72	0.45	0.67	0.75	0.75
Average	0.23	0.28	0.52	0.55	0.70	0.63	0.76	0.90	0.81	0.69	0.87	0.81	0.80

Table 5 shows the average intensity of this symptom, recorded every fourth week throughout the periods of both studies, permitting a comparison.

Flaring ribs were noted in 87.7 per cent. in white, and 70.7 per cent. in colored children, with a general average of 81.6 per cent. for

the entire study. It was first noted as early as the fourth week in white children and it was first noted as late as the thirty-sixth week. In colored children it was also first noted as early as the fourth week and it was also first noted as late as the thirty-sixth week.

Table 6 shows the average intensity of this symptom recorded every fourth week throughout the periods of both studies, permitting a comparison.

Craniotabes was the least frequent of the principal clinical symptoms occuring in 55.5 per cent. of white and 66.4 per cent. of colored children, with a general average of 62.3 per cent. for the study. In white

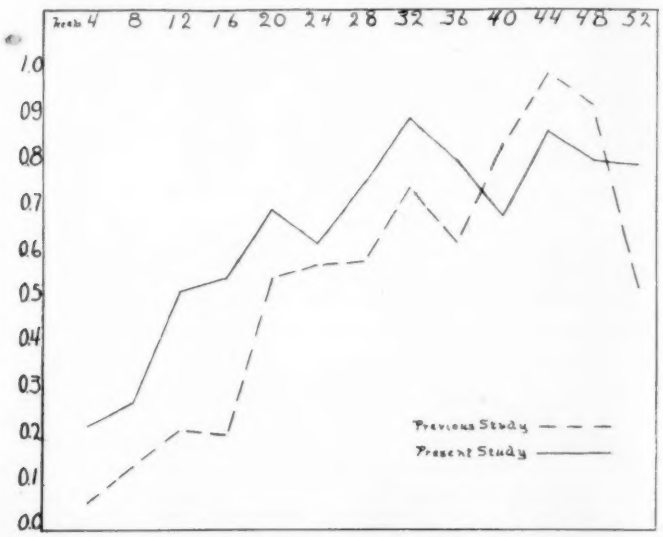

Chart 4.—Flaring ribs, showing average intensity in both studies, a comparison.

children it was first noted as early as the fourth week and it was first noted as late as the fortieth week. In colored children it was also first noted as early as the fourth week but it was first noted as late as the thirty-sixth week.

Table 7 shows the average intensity of this symptom recorded every fourth week throughout the periods of the both studies, permitting a comparison.

In this study, as in the previous one, each of the symptoms was first noted as early as the fourth week. The lateness with which the individual symptoms were first noted varied considerably.

Bow-legs were noted in several instances in this study but as this symptom could not be proved by exact methods, as for example, the roentgen ray, it was not studied especially.

It was again noted that the differences in the individual symptoms in the white and colored children increased as the frequency of the symptom decreased, with the exception of the two most frequent symptoms which were about the same.

TABLE 7.—*Frequency of Symptom of Craniotabes*

Previous Study without Cod Liver Oil		Present Study with Cod Liver Oil	
White	33.3	White	55.5
Colored	43.48	Colored	63.4
Average	39.5	Average	62.3

Average Intensity Craniotabes, Previous Study without Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.2	0.52	0.53	0.75	0.67	0.34	0.17	0.15	0.08	0.04	....	....	....
White	0.26	0.3	0.36	0.37	0.23	0.16	0.0	....	....	....	....	....	....
Average	0.2	0.42	0.46	0.61	0.52	0.26	0.1	0.1	0.05	0.03	....	....	....

Average Intensity Craniotabes, Present Study with Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.61	0.84	1.06	1.02	0.73	0.58	0.23	0.17	0.2	....	....	....	....
White	0.29	0.42	0.68	0.62	0.58	0.23	0.13	0.22	0.24	0.07	....	0.1	....
Average	0.48	0.68	0.92	0.87	0.66	0.45	0.14	0.20	0.14	0.30	....	0.06	....

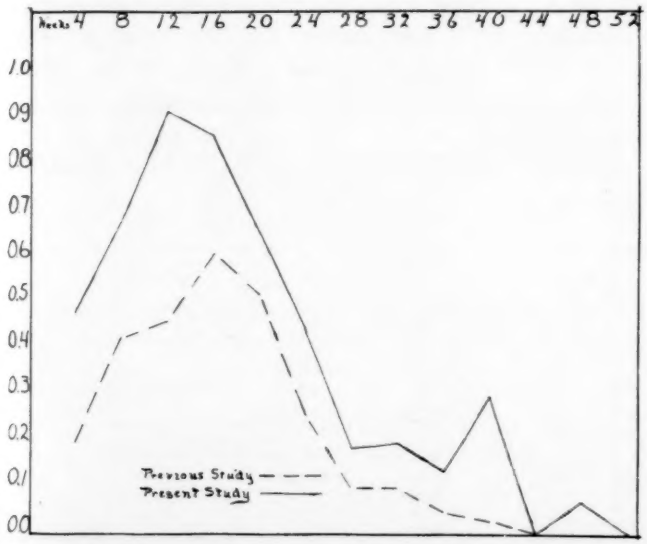

Chart 5.—Craniotabes. showing average intensity in both studies, a comparison.

Craniotabes was again of interest because of the comparative shortness of its duration. It was much more marked than in the previous study and its peak was a little earlier.

In Table 8, showing the average intensity of the combined clinical symptoms of rickets throughout the year it is interesting to note, first,

that the colored curve was again above that of the white and above the average for the entire study, while the white was persistently below the average for the study. It was further interesting from the point of view of the increased intensity during the period of the administration of cod liver oil as compared with the period of the previous study when

TABLE 8.—*Average Intensity Combined Symptoms Previous Study Without Cod Liver Oil*

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.25	0.43	0.56	0.67	0.72	0.74	0.75	0.82	0.77	0.86	0.84	0.94	1.01
White	0.22	0.33	0.40	0.63	0.47	0.54	0.47	0.58	0.54	0.58	0.65	0.56	0.54
Average	0.24	0.39	0.50	0.66	0.69	0.69	0.64	0.74	0.67	0.77	0.74	0.78	0.74

Average Intensity Combined Symptoms, Present Study with Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	0.55	0.66	0.84	0.82	0.87	0.82	0.83	0.90	0.81	0.96	1.01	0.94	0.89
White	0.46	0.50	0.65	0.72	0.72	0.64	0.57	0.77	0.72	0.68	0.75	0.83	0.98
Average	0.52	0.60	0.77	0.78	0.81	0.75	0.78	0.84	0.72	0.81	0.81	0.86	0.92

no cod liver oil was administered. During this study also the average intensity of the combined symptoms showed the rapid increase of the clinical symptoms of rickets during the first three months, further stressing our belief that rickets is not a disease of the second half of the first year but a disease which begins apparently soon after birth.

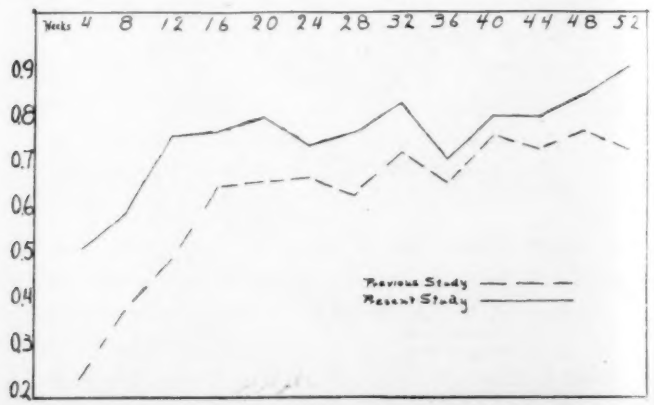

Chart 6.—Combined clinical symptoms of rickets, showing average intensity in both studies, a comparison.

The influence of rickets on the nutrition, growth and development during the administration of cod liver oil was worthy of note.

In the present study, as seen in Table 9, there was a marked increase in the frequency of "good" tissue turgor as compared with the previous study, the average for the white being 88.8 per cent. and for the

colored 85.7 per cent., with a general average of 86.09 per cent. for this study as compared with tissue turgor rated "good" or excellent in 63.1 per cent. for the white, 68.4 per cent. for the colored and with 65 per cent. for the average of the previous study. The general health of the infants as determined by the tissue turgor was much better

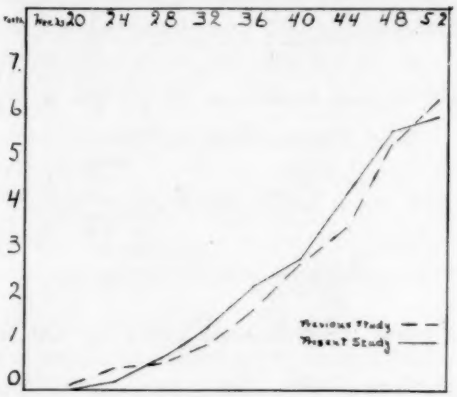

Chart 7.—Eruption of teeth, showing average intensity in both studies, a comparison.

TABLE 9.—*Tissue Turgor*

	Previous Study (per Cent.)					Present Study (per Cent.)			
	Excellent	Good	Fair	Poor		Excellent	Good	Fair	Poor
White	4	59.1	26.5	10	White	..	88.8	8.3	2.7
Colored	...	69.4	27.1	4	Colored	..	85.7	13.4	0.8
Average	1.4	65.0	27.0	6	Average	..	86.9	11.5	1.5

TABLE 10.—*Tissue Turgor Previous Study Without Cod Liver Oil*

	Excellent	Good	Fair	Poor
White	4.0	59.1	26.5	10
Colored	...	68.4	27.1	4
Average	1.4	65.0	27.0	6
Tissue Turgor, Present Study with Cod Liver Oil				
	Excellent	Good	Fair	Poor
White	...	88.8	8.3	2.7
Colored	...	85.7	13.4	0.8
Average	...	86.9	11.5	1.5

during the year when cod liver oil was given, and even in the presence of the greater manifestation of the clinical symptoms of rickets than during the period of the previous study when the clinical symptoms of rickets were less pronounced. It was, therefore, evident that the grade of tissue turgor did not seem to be influenced by the severity of rickets in the presence of the administration of cod liver oil.

In this study in which there was an increase of rickets as compared with the previous study, the eruption of teeth began a little later in both races. The eruption of teeth was more rapid in the white than in the colored race. The number of the teeth erupted in the white was

TABLE 11.—*Dentition, Previous Study Without Cod Liver Oil*

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	....	....	....	....	0.7	0.4	0.4	0.9	1.5	2.5	3.7	5.9	7.0
White	....	....	....	....	0.0	0.5	1.0	1.1	2.5	3.3	3.5	4.6	6.1
Average	....	....	....	....	0.1	0.45	0.6	1.0	1.8	2.8	3.6	5.4	6.4

Dentition, Present Study with Cod Liver Oil

	Weeks												
	4	8	12	16	20	24	28	32	36	40	44	48	52
Colored	....	....	....	....	....	0.24	0.62	1.4	1.9	3.4	3.8	5.3	5.3
White	....	....	....	....	....	0.16	0.92	1.5	2.6	4.0	5.2	6.2	6.6
Average	....	....	....	....	....	0.20	0.77	1.4	2.3	2.9	4.3	5.7	6.0

TABLE 12.—*Previous Study Without Cod Liver Oil, Sitting Alone*

	4 mo.	5 mo.	6 mo.	7 mo.	8 mo.	9 mo.	10 mo.	11 mo.	12 mo.
White	....	0.17	0.15	0.32	0.14	0.12	0.05	0.05	....
Colored	....	0.04	0.34	0.25	0.18	0.15	0.04	....	....
Average	....	0.12	0.23	0.28	0.16	0.13	0.05	0.03	....

Present Study with Cod Liver Oil, Sitting Alone

	4 mo.	5 mo.	6 mo	7 mo.	8 mo.	9 mo.	10 mo.	11 mo.	12 mo.
White	0.016	0.071	0.15	0.38	0.21	0.066	0.066	0.016	....
Colored	0.02	0.065	0.217	0.26	0.19	0.15	0.04	0.02	....
Average	0.018	0.075	0.17	0.33	0.20	0.10	0.05	0.013	....

Previous Study without Cod Liver Oil, Standing Alone

	4 mo.	5 mo.	6 mo.	7 mo.	8 mo.	9 mo.	10 mo.	11 mo.	12 mo.
White	....	....	....	0.08	0.08	0.15	0.23	0.45	....
Colored	....	....	....	0.15	0.0	0.23	0.305	0.23	0.08
Average	....	....	....	0.105	0.045	0.19	0.27	0.34	0.05

Present Study with Cod Liver Oil, Standing Alone

	4 mo.	5 mo.	6 mo.	7 mo.	8 mo.	9 mo.	10 mo.	11 mo.	12 mo.
White	....	....	....	0.05	0.0	0.05	0.315	0.37	0.21
Colored	....	....	....	....	....	0.46	0.18	0.18	0.18
Average	....	....	....	0.03	0.0	0.20	0.26	0.30	0.20

Previous Study without Cod Liver Oil, Walking

	4 mo.	5 mo.	6 mo.	7 mo.	8 mo.	9 mo.	10 mo.	11 mo.	12 mo.
White	....	....	....	....	....	....	....	0.26	0.74
Colored	....	....	....	....	0.14	....	....	0.14	0.72
Average	....	....	....	....	0.095	....	....	0.175	0.73

Present Study with Cod Liver Oil, Walking

	4 mo.	5 mo.	6 mo.	7 mo.	8 mo.	9 mo.	10 mo.	11 mo.	12 mo.
White	....	....	....	....	....	....	0.14	0.14	0.69
Colored	....	....	....	....	....	....	0.40	0.40	0.30
Average	....	....	....	....	....	....	0.25	0.25	0.50

greater than that for the white in the previous study. In the colored race also the eruption of teeth was a little more rapid than in the previous study, but at the end of the year, namely, the forty-eighth and fifty-second weeks, the average number of teeth for the colored was not as great as for the same period of the previous study.

Observations on the head, chest, abdomen, height and weight of the infants included in this study under the administration of cod liver oil and in the presence of more marked rickets, were practically identical with the observations in the previous study, with the exception of the heights of the negroes, who under the influence of cod liver oil increased more rapidly from the twelfth week on to the end of the year at which time the average height was 1½ inches greater.

The muscular development, as shown by the period at which the babies could sit alone, walk alone, and stand alone is shown in Table 11. The white and colored babies were able to sit alone at about the same age. The colored children, however, stood and walked earlier. In comparing the average periods for sitting alone, standing alone and

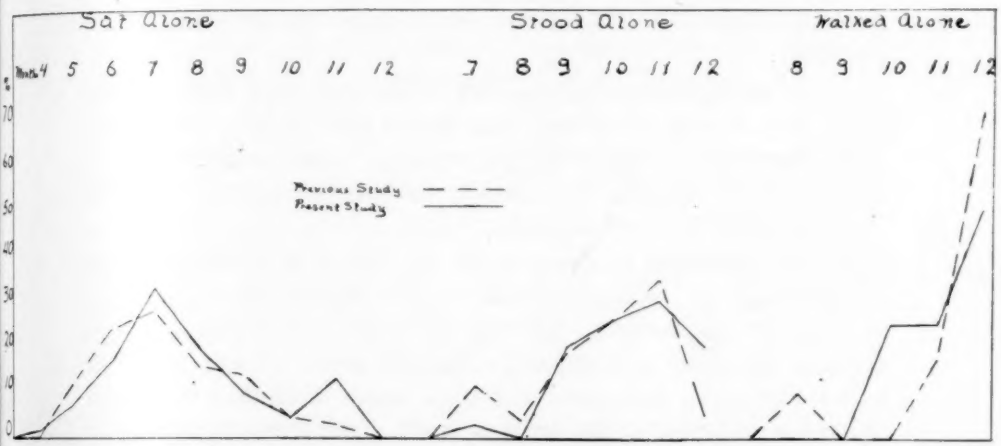

Chart 8.—Muscular development, showing average for both studies, a comparison.

walking alone in this study with those of the previous study there were no differences of any significance, except that the average age at which the infants walked alone in this study was somewhat later.

With regard to the effect of the severity of rickets on growth and development in this study there was nothing of note with the following exceptions: (1) in the most marked rickets in colored children the weights were greater than for the average of the colored for the same period; (2) the chests of the colored children were bigger in the least marked rickets than the average for the colored children in the study; (3) in the white children the abdomens were smaller in the most marked as compared with the average for the white children in this study.

SUMMARY

1. The clinical symptoms usually ascribed to rickets, namely, cranial bosses, costal beading, epiphyseal enlargement, flaring ribs, and craniotabes, formed the basis of this study.

2. Cranial bosses was the most frequent symptom recorded; costal beading, epiphyseal enlargement, flaring ribs and craniotabes followed in the order named.

3. These symptoms developed in spite of the administration of an emulsion of pure Norwegian cod liver oil in doses of one-half teaspoonful given three times a day.

4. The average intensity of each of these clinical symptoms was greater than in the previous study, when cod liver oil was not administered, with the exception of epiphyseal enlargement and costal beading. In each of these two symptoms the average intensity was less in this study.

5. All the symptoms began earlier in this study than in the previous one. It is of interest to note that in the first three months of this study there were eighty-nine hours less of actual sunshine and an average of 8.3 per cent. less possible sunshine per month than in the same period in the previous study.

6. The meteorologic summary for the period of this study showed the percentage of possible sunshine to be 2 degrees above the normal average. It was, however, 1.9 degrees less than for the period of the previous study. The precipitation for the period of this study was 6.28 inches above the normal and 10.91 inches more than the precipitation for the period of the previous study. The atmospheric pressure temperature and humidity were about the same as for the previous study.

7. The seasonal peak for the combined symptoms of the disease was noted in the month of July, the greatest height being July 26.

8. The seasonal peak for this study differed from the peak of the previous study which occurred in the month of March.

9. During the months of July and August the percentage of possible sunshine was at its minimum for the period of this study. The precipitation for these months was more than for any two consecutive months in the study.

10. The increase in the precipitation for July, 1923 (this year's peak), over July, 1922, was greater than the increase of precipitation for March, 1922 (last year's peak), over March, 1923.

11. The total number of hours of actual sunshine for the period of this study was 116.8 less than for the period of the previous study.

CONCLUSIONS

Considering rickets from the clinical symptoms ascribed to it, which occur within the first year of life and which formed the basis of this study, the disease was more marked during the period of this study when cod liver oil was given than during the period of the previous study. It may be that the amount of cod liver oil was insufficient as a preventive or that it was greatly deficient in the essential antirachitic factors, or that the adverse meteorologic phenomena were such as to offset the beneficial effects of the cod liver oil, or that the clinical symptoms ascribed to rickets may not be due exclusively to rickets, or that there may very likely be some other influencing factor or factors.

Considering rickets from the clinical symptoms of enlarged epiphyses and costal beading, the disease was beneficially influenced by the routine administration of cod liver oil in spite of the adverse meteorologic condition. Considered from all the clinical symptoms, sunshine and precipitation seemed to have their influence on the severity of the rickets, even in the presence of the administration of cod liver oil.

RÉSUMÉ OF THE LITERATURE ON MEASLES DURING 1922-1923 *

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GENERAL CONSIDERATIONS

Stimson [1] reviews the general features of measles stating that, except in extraordinary circumstances such as prevail in army cantonments with large numbers of susceptible adults, measles is more serious the younger the patient. The prodromal state is highly infectious, the virus has been shown to be present in the catarrhal discharges, also in the blood, and probably is not airborne. The time sequence of the typical symptoms is described, and the statistics show that the number of measles cases exceeds by one-third the total number of cases of all other contagious diseases. Complications described include catarrhal laryngitis (considered by Nobecourt, Grisogono and others to be far more common than previously supposed), bronchial pneumonia and purulent otitis media.

Practical points in the management of epidemics in civil communities are set down by Rowell [2] in an account of a measles epidemic in New Bedford, Massachusetts. Public opinion; prompt reporting of cases; open schools with teachers active in early recognition of prodromal symptoms; a three day exclusion rule with re-examination if indicated; and especially the recognition of immune persons with the consequent avoidance of unnecessary distress for afflicted families are the chief factors in obtaining good results. The author notes the large number of cases in which a fourteen day period intervened between exposure and recognition of the disease.

Kinnear [3] reports an epidemic in 1914 in the Highland Division, made up almost exclusively of nonimmune men from districts not visited by measles, emphasizing again the dangers of segregating susceptible adults. The greatest fatality was again attributed to a secondary bronchial pneumonia of a septic type. Among the 529 cases not one man had previously had measles, which may be taken as evidence against reinfections.

Rutherford [4] in a report of measles in the Columbus barracks states that over 80 per cent. of the total number (850) of cases were southern

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1. Stimson, P. M.: Arch. Pediat. **39**:11 (Jan.) 1922.
2. Rowell, H. G.: Bost. M. & S. J. **189**:101 (July 19) 1923.
3. Kinnear, W.: Edinburgh M. J. **30**:593 (Nov.) 1923.
4. Rutherford, H. H.: Mil. Surgeon **50**:619 (June) 1922.

born men from districts in which there had been no previous contact with the disease. The large numbers and the poor housing conditions were also considered important factors in the epidemic. In 1915 a routine vaccination of recruits with streptococcus emulsions was carried out. The cases that year came in crops and the symptoms were very severe, with aphonia in fully 50 per cent. of recoveries. A streptococcus was obtained from nearly all necropsies. The complications and deaths were lower on an average that year. This might or might not be due to vaccination.

McNabb [5] discusses the measles of enlisted men in 1917 and 1918. Secondary pneumonia occurred in 2,075 of the whole number of 45,573 measles cases in 1917. The chief preventive measures were isolation, cleanliness, and the segregation of hemolytic streptococcus carriers. This organism was frequently isolated, and among the carriers the incidence of complication was decidedly greater. Practically all fatalities among measles cases were from the secondary pneumonias which were either lobar, or lobular with frequent empyemas, the fluids of which were usually rich in streptococci. A comparison of the disastrous results during this period, with the report made by Sydenham in 1670, indicates that little progress has been made in the interval of centuries.

Of special interest therefore are the recent investigations concerning the etiology and prevention of measles.

ETIOLOGY

Micro-organisms.—Marie,[6] in a general review of the experimental work on the etiology and transmissibility of measles, gives a list of the different micro-organisms studied as possible etiologic factors in measles, including diphtheroids, Pfeiffer's bacillus, diplococcus (Tunnicliff), a pleomorphic gram positive bacillus (Sellards and Bigelow), hemolytic streptococcus, parasites and protozoa, and concludes that while the isolation of the specific organism is evidently difficult the active virus is, without doubt, present in the secretions and blood of the measles patient at certain periods.

Caronia [7] isolated a small diplococcus in anaerobic cultures of the blood, filtrates of nasal secretion, the bone marrow and the cerebrospinal fluid of measles patients. Rabbits inoculated intravenously with large doses of measles blood yield blood cultures of this same organism, and have specific antibodies for it. Inoculation of a healthy child with attenuated or inactivated cultures provoked immunity and larger doses

5. McNabb, P. E.: Mil. Surgeon **51**:313 (Sept.) 1922.
6. Marie, P. L.: Presse méd. **30**:711 (Aug. 19) 1922.
7. Caronia, G.: Presse méd. **31**:877 (Oct. 20) 1923; Pediatria **31**:801 (Aug.) 1923.

produced typical measles symptoms. The author considers that this evidence justifies recognition of this organism as the causative agent of measles.

Still another diplococcus is described by Thomson.[8] This was isolated from both measles and scarlet fever throats in special anaerobic cultures and is a minute gram-negative coccus. Because it has been isolated from normal sputum, is not filterable, and seems to be without effect on rabbits the author questions its rôle in the etiology of measles.

TRANSMISSIBILITY OF MEASLES

From Man to Man.—Marie continues his review, recalling that Home of Edinburgh in 1758 sought a rubeolization, similar to variolization, from which resulted benign cases of measles. The criticism that during an epidemic these "rubeolized" children may have otherwise contracted measles may also be applied to many other later reports. Mayr (1851) produced six cases of typical measles fourteen days following the subcutaneous injection of material from an early measles papule and from nasal secretions of a measles patient. Hektoen (1905) taking special precautions against outside contagion inoculated susceptible adults subcutaneously with 4 c.c. of an ascitic bouillon culture of blood, taken from a measles patient just at the time of eruption. The culture was made of 3 c.c. of measles blood in 50 c.c. of bouillon, incubated for twenty-four hours at 37 C. (98.6 F.) and was apparently sterile at the time of injection. In from ten to fourteen days an eruption, seemingly of measles, occurred associated with fever. Catarrhal symptoms and malaise were variable. Herrmann, in 1915, inoculated the nasal mucous membranes of infants, aged 6 months, with secretions from measles patients at the time of eruption and produced fever and eruption and subsequent tested immunity. Sellards (1919) was unable to confirm Hektoen's work. The suggestion has been made that the volunteers used had in reality a previous unrecognized attack of measles and so were not susceptible. Hiraishi and Okamoto attempted to immunize infants by injections of small amounts of citrated measles blood taken just before or at the time of the eruption. Amounts of from 0.001 c.c. to 0.002 c.c. produced after an incubation period of from ten to twelve days a reaction similar to "natural" measles. The conclusion is drawn that measles can be transmitted successfully experimentally from man to man, that the active virus is contained in the mucous secretions in early periods and also in the blood during the twenty-four hours preceding the appearance of the eruption, and from the twenty-four to thirty hours following its appearance.

From Man to Animals. 1. To Monkeys.—The transmission of measles to animals has been given many trials with varying results.

8. Thomson, D.: J. Trop. Med. **26**:227 (July 2) 1923.

Chavigny (1898) reported that a cynocephalus contracted measles from the gardener's son. Josias later tried to inoculate monkeys with active nasal secretions and succeeded only with certain species. Grunbach had negative results in inoculations of the chimpanzee with nasal secretions and blood. Anderson and Goldberger used over one hundred monkeys of three different species. Blood, nasal secretions and filtered blood were used and passage through a series of monkeys was accomplished with a certain degree of success with all different methods. The incubation period varied from three to twenty-one days and the more constant symptoms were fever and eruption, rarely coryza and respiratory disturbances. Hektoen and Eggers reported a leukopenia in monkeys inoculated with measles blood, while Lucas and Priser report both leukopenia and Koplik spots on the tenth day, and Tunnicliff in one animal noted a protracted leukopenia but no exanthem or Koplik spots.

Marzmowsky and Jurgelunas both obtained irregular results which they concluded were of negative value. Sellards and Wentworth injected monkeys with measles blood and obtained a few symptoms, rash and leukopenia, but blood from this monkey injected into a human volunteer produced no effect. With mucous secretions negative results were obtained.

Nicolle and Conseil obtained successful inoculation of a monkey, with subsequent passage to other monkeys and back to a child who developed a typical measles. Blood from this child was injected into three other monkeys of which two reacted with fever. Blake and Trask, using nasopharyngeal secretions obtained by means of salt solution irrigations, inoculated monkeys intra-tracheally with amounts sufficient to produce regurgitations. Of ten monkeys inoculated eight showed signs of measles, and of the other two, one had pneumonia and died on the eighth day, in the other the results were too indefinite to be of value. The symptoms noted after from six to ten days incubations were malaise, anorexia, catarrhal conjunctivitis, leukopenia, (late in prodrome), Koplik spots and febrile reaction (less constant). Then on the third or fourth day the exanthem appeared, followed from six to ten days later by recovery. The histology of the macule was found to be the same as described in the lesion of human measles. Filtrates were also used, and passage to the sixth of a series of monkeys was accomplished but the virulence seemed eventually to disappear.

Kawamura [9] used three *Macacus fuscatus,* injected them with measles blood collected four days before the eruption and produced all the characteristic symptoms of measles. Marie considered the balance of the evidence to favor acceptance of positive transmission of measles to monkeys.

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9. Kawamura, R.: Jap. M. World **2**:31 (Feb.) 1922.

TRANSMISSION TO RABBITS AND GUINEA-PIGS

Behla, Jurgelunas and Kawamura all had negative results in attempts to transmit measles to rabbits and guinea-pigs. Harde inoculated three rabbits with from 1 to 2 c.c. citrated measles blood and obtained an erythema, the same as after injections of normal or scarlet fever blood.

Nevin and Bittman [10] inoculated rabbits intravenously with measles blood and produced an erythema with a subsequent desquamation. A monkey injected with blood from a rabbit, to which the fifth passage of virus had been made, gave distinct signs of measles and was immune according to later inoculation tests. Later these same workers [10] passed the virus (using intravenously citrated blood taken from measles patients on the second day of illness) through a series of four rabbits, then injected a monkey with 10 c.c. of last rabbit's blood and produced leukopenia, enanthem, exanthem and desquamation. In a second series the passage was made through three rabbits, then through three monkeys, each of which showed typical signs of measles. The control monkey that received normal blood showed no reaction. The conclusion is drawn that the measles virus survives passage through rabbits and produces in monkeys symptoms typical of measles.

Tunnicliff and Moody [11] cultured a green producing diplococcus from the blood and throats of measles patients. They also call attention to the fact that other organisms were isolated from the blood of measles patients at the height of an attack of measles but not in the pre-eruptive, infective stage, and that no immune reactions for these organisms were demonstrable. Suspensions of the diplococcus injected into monkeys both intravenously and intratracheally produced symptoms of measles, and subsequent reinoculations with either nasopharyngeal secretions or cultures of the diplococcus indicated, by a lack of reaction, an immunity. They conclude from all their work that monkeys, guinea-pigs and rabbits are susceptible to measles when inoculated with washings of the nose and throat of measles patients, and that the same symptoms may be produced in these animals by the diplococcus described. The organism was filterable.

Grund [12] irrigated the nasopharynx of measles patients with from 30 to 50 c.c. salt solution, cultured the fluid for bacterial types, and injected rabbits intratracheally with from 5 to 10 c.c. A few received filtrates. The cutaneous eruption and desquamation, and the conjunctival inflammation were the most constant symptoms, while the fever,

10. Nevin, Mary, and Bittman, F. R.: Further Notes on Experimental Measles in Rabbits and Monkeys, J. Infect. Dis. **32**:32 (Jan.) 1923.

11. Tunnicliff, R., and Moody, W. B.: Experimental Measles by Inoculation of Monkeys, Guinea-Pigs and Rabbits with Green-Producing Diplococcus, J. Infect. Dis. **31**:382 (Oct.) 1922.

12. Grund, M.: Susceptibility of Rabbits to Virus of Measles, Inoculations with Nasopharyngeal Material, J. Infect. Dis. **30**:86 (Jan.) 1922.

the leukopenia, and the enanthem were inconstant. Transmission apparently failed with most rabbits, and passage to other rabbits could not be made with rabbit nasal secretions though there was success with blood and preparations from lung lesions. Subsequent immunity tests gave unsatisfactory results. Rabbits seem to be susceptible to measles virus but have a syndrome characteristic only within wide limits.

Duval and D'Aunoy [13] injected defibrinated measles blood, from 1 to 2 c.c. into the hearts of guinea-pigs and produced specific results. Fever and leukopenia were present from nine to twelve days after inoculation, with consequent immunity for the recovered animals. Pathologic examination revealed a hemorrhagic nephritis in affected animals. Passage even to the eighth rabbit was successful with indications of an increased virulence. Control animals showed no response to normal blood. Measles blood was found active only when taken from the patient at the time of eruption. Thirty-six hours before and twenty-four hours after its appearance the blood gave no reaction.

In rabbits inoculated intravenously with measles blood or intratracheally with nasal secretions, Duval and D'Aunoy [14] also find definite reactions analogous to those of human measles. Several rabbits developed an acute hemorrhagic nephritis. About 90 per cent. of the rabbits had pyrexia, leukopenia and cutaneous reaction within from two to five days and then a rash in from three to seven days. They also report a striking increase in virulence after passage through several rabbits. No pneumonic condition was observed, which is used to interpret the frequent secondary pneumonias in the human being as a result merely of a loss of normal defense.

PROPHYLAXIS

Marie [15] also reviews the literature on the prophylaxis of measles, citing its great prevalence and danger especially for the very young, the poorly nourished or weak, the children in institutions, and adults in overcrowded quarters such as the U. S. Army cantonments in 1917. The usual methods of isolation have proved ineffectual, partly because of the extreme infectiousness of the prodromal period which so often goes unrecognized. Two procedures are to be considered; passive immunization which is transitory but often most useful, and active immunization which is difficult but promising.

In 1916, Nicolle and Conseil used the serum of blood from a convalescing child in subcutaneous injections of 4 c.c. to protect contacts. Later they again used convalescent serum, taken this time from an adult.

13. Duval, C. W., and D'Aunoy, R.: J. Exper. Med. **35**:257 (Feb.) 1922.
14. Duval, C. W., and D'Aunoy, R.: J. Exper. Med. **36**:231 (Aug.) 1922.
15. Marie, P. L.: Presse méd. **30**:457 (May) 1922.

Richardson and Connor (United States) took blood from a patient twenty-five days after the appearance of the eruption, mixed the different serums, preserved it with small amounts of tricresol (0.25 per cent.). Three of four exposed children were given intramuscular injections of this convalescent serum and did not have measles, but the fourth, uninoculated, developed measles twelve days after isolation. Further successful work combined vaccination with serum treatment. Fifteen cubic centimeters of convalescent serum were injected at the same time as an inoculation with nasopharyngeal secretions. Twelve days later an abortive subcutaneous measles eruption appeared. Torres and Pacheco (South America) also used convalescent serum in all exposed children with good results.

Degkwitz [16] in a clinic in which there had been 29 per cent. mortality for children, aged under 2½ years, made 700 successful injections of convalescent serum. Many others followed his work, reporting over 1,700 cases. The method advised is the sterile collection of blood from 7 to 9 days after defervescence of healthy measles patient. Serums are mixed and kept on ice with 1 drop of 5 per cent. phenol solution added to every 40 c.c. of serum. The unit dose of mixed serum, from 2.5 to 3 c.c., injected before the fourth day protects a child up to the age of 14 years. If serum from a single donor is used the dose should be increased from 4 to 7 c.c. Injections made the fifth or sixth day of incubation require 2 units (from 6 to 7 c.c.) for protection, on the seventh day produce uncertain results, on the eighth day or later have no effect. Smaller amounts just below the minimal protective dose injected early are followed by a benign form of measles with subsequent active immunization. Adult serum may be used if convalescent serum is not available. Doses of 30 c.c. injected before the fourth day of incubation gave complete protection in about 50 per cent. of cases and altered the course in the remainder. Degkwitz records the collection of from 1,500 to 2,000 doses of convalescent serum from children and nurses, and strongly advises organized routine for the collection and distribution of convalescent serum for the protection of the rachitic, tuberculous, or otherwise weakened children, and for use in day nurseries, kindergarten, infirmaries and schools. Concerning the duration of the immunity which he considers to have an indirect active phase, he expresses a need for further work. Reinoculation is considered advisable in many cases. Among many other reports he gives a record of eighty-two inoculations at one time. Only twelve developed measles, and these were already in the fever stage at the time of inoculation. Of the other seventy who were again exposed after nine months only two had measles. Again, in four and one-half

16. Degkwitz, R.: Deutsch. med. Wchnschr. **48**:26 (Jan. 5) 1922.

months, exposure was followed by six cases of typical measles and three of bronchial pneumonia that might indicate measles among the more recently immunized new arrivals, while there were no cases in those immunized over a year before.

Kutter,[17] using the Degkwitz routine, reports great success. He confirms the variations in the use of single serums, of late injections of mixed serums with abortive cases. There is a possibility that some of these delayed abortive cases are due to a second exposure. Isolation for measles cases in institutions is not required, for when convalescent serum is administered within the first four days of incubation the epidemic is stopped.

Kundratitz [18] reports the successful use of convalescent serum in a large number of cases, including thirty-nine nurslings. Failure in a few cases could be attributed to the small dose of from 1 to 2 c.c. Uninoculated children at the same time had typical cases.

As mentioned before, Hiraisko and Okamoto used citrated measles blood from the infective stage in small quantities, from 0.001 to 0.002 c.c. or in still smaller repeated doses ranging from 0.0001 to 0.0002 c.c. to produce active immunity.

Herrman, in 1915, inoculated healthy infants, aged 5 months, with active nasal secretion and forty of these reacted slightly. Four of these infants were immediately exposed to measles, with no effect, and later two more exposed at the age of 22 months did not take the disease. This is evidence of active immunization.

Later Herrman [19] used for the passive immunization of very young or weak children, and particularly of those in institutions, intramuscular injections (preferably before the fourth day after exposure) of from 3 to 6 c.c. of convalescent serum. This was collected in from 60 to 80 c.c. amounts from healthy children, aged over 3 years, about one week after defervescence. The serum was pooled and preserved with tricresol. This immunity lasts only about eight weeks at the best. Active immunization was also attempted. Nasal secretions from uncomplicated measles cases were taken from twenty-four to forty-eight hours before the eruption, mixed with salt solution and centrifuged. A few drops of this fluid were then applied to the mucous membranes of healthy infants aged from 4 to 5 months. A slight reaction usually resulted, but in 165 inoculations there was no unfavorable result. Forty-five of these were directly exposed to measles without effect, and none that had a definite reaction to the inoculation took measles. Reinoculation after six or seven months

17. Kutter, P.: Ztschr. f. Kinderh. **36**:119, 1923.
18. Kundratitz, K.: Wien. med. Wchnschr. **73**:1200, 1923.
19. Herrman, C.: New York State J. Med. **23**:93 (March) 1923.

may be advisable, the aim being to produce an immunity that will persist for at least two years, for it is in that period that 75 per cent. of all deaths occur.

Herrman,[20] following Pirquet's observations, states that for children born of an immune mother (one who has had measles) there is absolute immunity during the first two months of life, a relative immunity up to the fifth month with decrease after that time so that only a few retain any immunity up to nine months. After that they are as susceptible as older children and practically all contract the disease on exposure. Artificially as well as breast fed infants enjoy this protection, which is doubtless conveyed through the placenta and not through the breast milk, as suggested by Petenyi.[21] Criticism of the latter's work is made because his breast milk inoculated infants that failed to contract measles were within or near the protected ages.

Zimmermann[22] used the Degkwitz method, and reports that of twenty-eight protected by convalescent serum injections only two or 7.14 per cent. had measles. Von Torday treated 261 after the seventh day; 6 per cent. were sick. Of sixty-five treated before the sixth day 3 per cent. were sick. Of twenty-three not treated ten were sick, 43.48 per cent. To the use of serum was given the credit for the quick suppression of the epidemic at the clinic.

McNeal[23] also reviews the literature and adds that donors were bled five, seven or nine days after the fever had stopped. Six cubic centimeters of serum was bottled with 0.01 per cent. tricresol and kept on ice. Sixteen exposed children were given 5 c.c. of serum intramuscularly. Four had mild measles, and the incubation period in three was nineteen days. There were no complications or sequelae. The method is particularly applicable to the physically weak children and those in institutions.

Schilling[24] had good results but finds difficulty in getting sufficient serum because so few adults have measles. The question of the value of nonspecific protein therapy is brought up. Cheinisse[25] reports the use of whole citrated blood, with encouraging results. The use of convalescent serum in an adult with a grave measles complicated by pneumonia indicates a curative as well as a preventive value.

Another review is given by Comby,[26] including all important contributions. Nobécourt and Paraf[27] in a children's hospital took blood

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20. Herrman, C.: New York State J. Med. **23**:404 (Oct.) 1923.
21. Petenyi, G.: Monatschr. f. Kinderh. **22**:486, 1921.
22. Zimmermann, R.: Deutsche med. Wchnschr. **49**:1131 (Aug. 31) 1923.
23. McNeal, M. D.: The Serum Prophylaxis of Measles, J. A. M. A. **78**:340 (Feb. 4) 1922.
24. Schilling, E.: Klin. Wchnschr. **1**:2471 (Dec. 9) 1922.
25. Cheinisse, L.: Presse méd. **30**:846 (Sept. 30) 1922.
26. Comby, J.: Arch. de méd. d'enf. **25**:614 (Oct.) 1922; ibid, **26**:686 (Nov.) 1923.
27. Nobécourt, P., and Paraf, J.: Presse méd. **30**:497 (June 10) 1922; ibid, Rev. gén de clin. et de thérap. **37**:449, 1923.

from two adults and a child from ten to twelve days after the fever. The serum was heated to 56 degrees twice with a twenty-four hour interval, and then 3 c.c. was injected subcutaneously. Three boys and two girls so injected had no measles, while two others unprotected in the same family had measles. In a second group in the hospital nine received subcutaneously 3 c.c. of convalescent serum. No cases of measles developed. Ten not injected had the usual attack. So it seems conclusive that injections before the sixth day do protect.

Estella and de Castro [28] dried convalescent serum that was collected during an epidemic, and sealed it in ampules. Each contained one dose, the residue of 5 c.c. of serum. This kept indefinitely.

Galli [29] reports the use of diphtheria antitoxin and of normal horse serum in children of an asylum. Six out of twelve received the antitoxin and had not measles in spite of exposure. Twenty-four already in the incubation stage received horse serum and only three had measles. Cenci, in 1906, records shortening a measles epidemic by the use of diphtheria antitoxin.

Further review of the literature is contained in an article by Debré and Ravina.[30] In their hospital they take systematically from 10 to 40 c.c. of blood from all healthy convalescent children. They then use from 2.5 to 3 c.c. of serum intramuscularly to protect a child under 3 years. The use of convalescent serum is, however, limited to nurslings, weak children and exposed susceptible people. It would be preferable to get an attenuated form of measles by injecting from 2.5 to 3 c.c. of convalescent serum from the seventh and the tenth days of incubation. The difficulty of judging the date of exposure interferes, for after the tenth day even from 6 to 10 c.c. has no effect. Attempts to bleach the skin by intradermal injections, according to the Schultz-Charlton procedure, were unsuccessful. The exanthem is the most resistant symptom to convalescent serum treatment.

Méry, Gastinel and Joannon [31] collected blood on the fifteenth day of sickness and injected the serum, getting protection when given before the sixth day as others have shown. The need of regulating this prophylaxis is noted, just as Degkwitz advised some central control, so that convalescent serum could be always available.

A review of work and references on inoculation with measles virus is given by Blackfan, Peterson and Conroy [32] beginning with a letter

28. Estella, y B., de Castro, J.: Arch. españ. de pediat. **6**:517 (Sept.) 1922.
29. Galli, P.: Pediatria **30**:898 (Oct. 1) 1922.
30. Debré, R., et Ravina, J.: Bull et mém. Soc. méd. d. hôp de Par. **47**:226 (Feb. 9) 1923.
31. Méry, H.; Gastinel, P., and Joannon, P.: Bull. Acad de méd., Par. **89**:194 (Feb. 6) 1923.
32. Blackfan, K. D.; Peterson, M. F., and Conroy, F. C.: Ohio State M. J. **19**:97 (Feb.) 1923.

written by Cook in 1767, who advises the procedure and describes the technic. Their results with convalescent serum are as follows:

1. Fifty-nine were exposed to measles. Within from two to five days each was given 5 c.c. of convalescent serum and only five had measles. These cases were very mild.

2. Thirteen were given convalescent serum within from seven to eight days. Six had measles, very mild cases.

3. Sixteen received convalescent serum from one to two days after exposure. Twelve received 5 c.c. No measles developed although one child lived in the measles ward. Four untreated patients in a separate ward had measles.

Dopter [33] says if results continue so good, systematic arrangements for the collection and distribution of serum should be made.

De Jong and Bernard [34] obtained excellent results from use of convalescent serum during a severe epidemic. Only one injected child had measles and that was mild.

Salomon [35] used normal adult serum and serum from a convalescent child with about parallel results. The 50 per cent. failure to protect was doubtless due to too small doses.

Kemmerer [36] describes the inconvenience and distress caused by susceptible men in the navy. An entrance requirement of a certificate stating a previous attack of measles is considered advisable. The advantage of the use of convalescent serum and of vaccination or exposure of susceptible people at favorable times is discussed.

Rietschel [37] recommends the injection of from 20 to 25 c.c. of mothers' blood or of blood of a relative who has had measles to protect infants.

Cambessédès and Joannon [38] also found convalescent serum effective in the protection of young children in a recent measles epidemic.

Ratnoff [39] reviews the work with convalescent serum with special reference to the reports by Degkwitz.

Debré, Bonnet and Broca [40] report some significant results with convalescent serum taken as Degkwitz, Nicolle and Conseil and others agree, from seven to nine days after the temperature drop. Subcutaneous injection was made of from 1 to 5 c.c. at the beginning of the invasion period just as the catarrhal symptoms and the Koplik spots

33. Dopter, C.: Paris méd. **13**:504 (June 2) 1923.
34. De Jong, S. T., and Bernard, E.: Bull et mém. Soc. méd. d. hôp de Par. **47**:500 (March) 1923.
35. Salomon, G.: Deutsche. med. Wchnschr. **49**:1151 (Aug.) 1923.
36. Kemmerer, T. W.: U. S. Nav. M. Bull. **19**:718 (Nov.) 1923.
37. Rietschel: Deutsch. med. Wchnschr. **49**:1386 (Nov. 2) 1923.
38. Cambessédès, H., and Joannon, P.: Médecine **5**:209 (Dec.) 1923.
39. Ratnoff, H. L.: Arch. Pediat **40**:683 (Oct.) 1923.
40. Debré, R.; Bonnet, H., and Broca, R.: Compt. rend. Soc. de biol. **89**:90, 1923.

appeared, and when the rash appeared there was inhibition in the region about the point of injection varying from the size of a silver dollar to that of the palm of the hand according to the amount injected. This is a constant inhibition. Injection after the beginning of the eruption has no effect, as observed before in attempts to get a reaction similar to the Schultz Charlton extinction test. This by negative normal serum tests was shown to be specific.

General medical rules for the treatment of measles are detailed by Craiger,[41] who places most emphasis on fresh air, proper feeding and well regulated warmth for the measles patient.

DIAGNOSIS

In differentiating the primary symptoms of measles and scarlet fever, Piédelièvre [42] emphasizes the importance of Koplik spots which may be found even one week before the eruption and are pathognomonic of measles. In scarlet fever there is early a low blood pressure and distinct

TABLE 1.—*The Differential Diagnosis of Measles (Scheffer) in Adult Aged 21 Years*

	First Day Ill	Second Day Ill	Third Day Ill	Fourth Day Ill	Fifth Day Ill	Sixth Day Ill
Leukocytes	3,900	3,700	5,150	6,600	6,400	7,300
Neutrophils, per cent.	68	57	52	49	54	65
Lymphocytes	14.5	17	19.5	17	19.5	21.75
Monocytes	2	6	4	3.3+	4	2
Eosinophils	2.5	1.5	2.5	3	2	2
Transitionals	13	12.5	11	9.5	7.5	6.25
Radkern lymphocytes	.....	.....	1	2	2.5	1
Radkern plasma cells	.....	5	9	15.25	11	2
Lymphoblasts	.....	1	1	1	.....	.....

enlargement of the spleen. The Schultz and Charlton sign of blanching with intradermal injection of convalescent serum is valuable, but not in early diagnosis.

Nöthen [43] describes four cases in which children convalescent from scarlet fever had measles. The true eruption was preceded by a pre-eruption that came and went repeatedly within a few hours or days presenting all forms of rashes including rose spots, urticaria and purpura as well as those of scarlatina and measles. The only value claimed for its recognition is as a clue to the diagnosis.

Scheffer [44] recalls the difficulties of the differential diagnosis of measles on the basis of glandular swelling, Koplik spots and exanthems. He reviews certain reports on the blood picture, including Klaatsch (1885) who claims an increase in plasma cells to 21 per cent. Naegeli

41. Craiger, F. F.: Lancet **1**:864 (April 28) 1923.
42. Piédelièvre, R.: Médecine **4**:210 (Dec.) 1922.
43. Nöthen, F. J.: Jahrb. f. Kinderh. **98**:211 (May) 1922.
44. Scheffer, W.: Ztschr. f. Kinderh. **35**:239 (June 29) 1923.

describes lymphocytes whose nuclei have radiating chromatin and similar large plasma cells. The author gives a table of his counts showing similarity to Naegeli's findings (Table 1).

His attempts to produce blanching by the injection of immune serum intradermally, as Schultz and Charlton did in scarlet fever, were unsatisfactory and in no cases definitely positive.

Usbeck [45] in his blood studies finds the classical blood picture of a leukopenia, relative lymphopenia and an eosinophilia far from constant. In many particularly complicated cases there is a leukocytosis with relative lymphocytosis and eosinophilia or normal eosinophil count. He also describes plasma cells in greatly increased numbers. The blood picture is not always reliable for differential diagnosis, its chief value is rather in prognosis.

TABLE 2.—*Blood Findings in a Case of Mixed Infection*

	Prodromal White Blood Cell Count	Tenth Day Incubation Lymphocytosis	Day of Eruption	During Eruption
Case 1 (2 yrs.).....	19,400	66.5%	6,400	50% lymphocytes 10% eosinophils
Case 2 (10 mos.).....	14,000	67.0%	7,600	
Case 3. Bronchopneumonia, light complications.....		85.5%	17,800	29,600 total 64% lymphocytes

Case 4 (12 mos.). No eruption. Rise of temperature and decreased white count to 8,000 on the day that the others erupted. Polymorphonuclears, 51%; had been 18%.

TABLE 3.—*The Statistics for the Measles Patients*

Determinations	Thirty-Six Patients Examined
1. Under 25 mg.	16 patients
2. From 36 to 45, slightly over normal	14 patients
3. Over 45, high	6 patients

Cohn [46] describes the blood findings (Table 2) in a case of mixed infection of measles and whooping cough. In the first a leukopenia with relative lymphopenia is expected, while in the latter a high leukocytosis and relative lymphocytosis is usual.

The figures given are of interest but give support to the view of Usbeck that varying atypical blood pictures are most frequently found in complicated cases. Cohn [47] also makes a report (Table 3) on the nonprotein nitrogen in the blood of pneumonia, scarlet fever, measles and diphtheria patients.

A febrile albuminuria was found just as often with a high as with a low nitrogen value. The blood nitrogen is not dependent on the

45. Usbeck, G.: Ztschr. f. Kinderh. **36**:182, 1923.
46. Cohn, E.: Deutsch. med. Wchnschr. **47**:1357 (Nov. 10) 1922.
47. Cohn, E.: Deutsch. med. Wchnschr. **48**:226 (Feb. 16) 1923.

duration of the process of the disease, and only in exceptional cases did a high nitrogen value seem to indicate an unfavorable prognosis.

Von Winterfeld and Hahne [48] studied the white blood cell reaction in measles and scarlet fever. Of twenty-eight measles cases there was a leukopenia (under 4,000) in the eruptive period in only two cases (21.6 per cent.); a normal count from 4,000 to 8,000 in eighteen (64.4 per cent.), and a leukocytosis in 14 per cent., all of which were complicated cases.

Differentials.—Twenty-five per cent. had lymphopenia (under 20 per cent.); 28 per cent. had normal number lymph cells, from 21 to 29 per cent.; 52 per cent. had lymphocytosis, over 30 per cent.; 24 per cent. had eosinopenia, minus 0 per cent.; 56 per cent. had normal eosinophil count, from 1 to 3 per cent.; 20 per cent. had eosinophilia, from 4 to 9 per cent.

Although the picture is not characteristic in measles still there are a few general indications. A leukocytosis in an uncomplicated case speaks against measles. A lymphocytosis speaks in general for measles. Eosinophils are not characteristic.

COMPARISON WITH SCARLET FEVER

Leukocytosis points to scarlet fever, against measles; lymphocytosis points to measles, against scarlet fever; high eosinophilia points to scarlet fever; normal eosinophilia is not against measles.

Koplik spots and the diazo reactions they report are very uncertain for diagnosis. The blood picture has a value in differentiating toxic erythemas and drug rashes.

Campbell and Murphy [49] studied 821 cases, including 124 of German measles, so were able to make definite comparisons. The lack of the prodromal symptoms of coryza, malaise and cough, the average lower temperature, infrequency in children, variation in the rash, vague incubation period, infrequency of complications were distinguishing features of German measles, a disease quite distinct from true measles which is far more dangerous.

A study of the diazo reaction of measles cases was made by Malenberg,[50] who had positive results in 73 per cent. of thirty-three cases. There seemed to be a relation between the number of leukocytes in that the reaction was positive during the decline and then disappeared as the count became normal.

The cause of this reaction in urine is attributed by Hunter [51] to many substances, including histidin and tyrosin products. In a quantitative

48. Von Winterfeld, H. K., and Hahne, E.: Klin. Wchnschr. **2**:1977 (Oct.) 1923.
49. Campbell, D. G., and Murphy, E. G.: Canad. M. A. J. **12**:7 (Jan.) 1922.
50. Malenberg, N.: Acta Pediat. **2**:101, 1922.
51. Hunter, G.: Brit. M. J. **2**:751 (Oct. 21) 1922.

study of measles urine he found histidin responsible for 85 per cent. of the color produced by the diazo reagent. In measles the output of histidin in urine is increased.

COMPLICATIONS, SEQUELAE AND UNUSUAL CASES

Mixsell and Giddings [52] report 3,080 cases of measles of which 826 had pneumonia or one in every four. Four hundred and twenty-four of these died (51.33 per cent.) which was 89.20 per cent. of the total number of deaths. Prevention of such disastrous secondary effects of measles depends largely on eliminating unfavorable living conditions, making arrangements for more intensive nursing care, and providing opportunity for caring for as many as possible in private homes rather than in hospitals. A good clinical review of cases, pathologic findings and general medical treatment are given.

Doskočil [53] cultivated pneumococci from blood of all his cases of measles complicated by pneumonia. Some positive cultures were also obtained in older children without any clinical signs of pneumonia. In the younger children the bacteremia preceded the pulmonary inflammation. The author considered it a secondary infection.

McNabb [5] in his report also emphasizes the importance and the gravity of the secondary pneumonia in measles.

Renaud [54] found grave ear conditions at necropsy that had not been suspected. In all fatal measles cases the otitis was at least partly responsible. The secondary purulent condition is considered the aggravating factor in most grave measles cases.

Martini [55] describes an unusual complication in a boy, aged twelve years, in which the phalanges of the thumb were removed following extreme swelling and fluctuation. The bone was lardaceous and the color of dried leaves. L'Antonucca and Bindi [56] have also given reports of bone complications with measles. Mediastinal and subcutaneous emphysema were also observed in a child, aged 3 years, convalescent from measles with a bilateral bronchopneumonia.

Bullous eruptions with measles are reported by Morton [57] and Burdick.[58] Both review the previous reports of similar cases, which are few. Reports by Steiner, Henoch and Baginsky are referred to, and Heimmüller, in 1915, described pemphigus epidemic coincident with measles.

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52. Mixsell, H. R. and Giddings, E.: Southern M. J. **16**:90 (Feb.) 1923.
53. Doskočil, A.: Cas. lek. cesk. **62**:389 (April) 1923.
54. Renaud, M.: Bull. et mém. Soc. méd. d. hôp. de Paris **46**:693 (April 28) 1922.
55. Martini, G.: Riforma Med. **39**:342 (April 9) 1923.
56. Bindi, S.: Gass. d'osp. **43**:308, 1922.
57. Morton, E.: Brit. J. Child. Dis. **18**:188 (Oct.) 1921.
58. Burdick, J. R.: J. Oklahoma M. A. **15**:12 (Jan.) 1922.

A case of purpura fulminans following measles was described by Kelly.[59] This is uncommon with measles, although fifty cases of purpura following scarlet fever have been reported in the last twenty years. No blood count was recorded.

A very resistant case of urticaria was reported by Apert and Broca [60] to have entirely disappeared during the ten days preceding and the ten days following the appearance of a measles rash. Only tentative explanations were offered by the authors.

Juareguy [61] comments on the extreme gravity of the last measles epidemic in Montevideo. The general mortality in 1922-1923 was from 30 to 40 per cent. instead of the usual from 2 to 5 per cent. Acute gastro-intestinal symptoms were common and no treatment had any effect except on one case that was ameliorated by gastric lavage.

Reiche [62] reports sixteen cases of measles with a diphtheria complication. All except two of the patients died in spite of the use of antitoxin.

COMMENT

The salient points brought out in the reports are: first, the serious nature of measles especially when complicated by secondary infections, of which pneumonia is the most common and the most fatal; second, the encouraging achievements in the investigations concerning the etiology and preventive treatment with both convalescent serum and vaccination.

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59. Kelly, E. H.: Brit. J. Child Dis. **19**:86 (April) 1922.
60. Apert, E. A., and Broca, R.: Bull. et mém. Soc. méd. d. hóp. de Paris **47**:152 (Feb. 2) 1923.
61. Juareguy, M. A.: Rev. méd. d. Uruguay **26**:389 (Sept.) 1923.
62. Reiche, F.: Med. Klin. **19**:1539 (Nov. 25) 1923.

Abstracts from Current Literature

Anatomy and Physiology

THE DISAPPEARANCE OF THE FONTANEL IN THE FIRST YEAR. PETER RYHINER, Jahrb. f. Kinderh. **105**:335, 1924.

Whereas the anterior fontanel of normal infants decreases steadily in size from birth to closure in about one year, in rachitic infants there is a delayed decrease or even an increase in size from the sixth to the tenth month. The fontanel measurement is presented as a good criterion of the efficiency of antirachitic therapy.

SUTHERLAND, Chicago.

ROENTGENOLOGIC STUDIES ON THE PERISTOLIC FUNCTION OF THE STOMACH IN INFANTS AND ITS RÔLE IN THE ETIOLOGY OF HABITUAL VOMITING. JULIUS ROGATZ, Ztschr. f. Kinderh. **38**:1, 1924.

Studies of the stomachs of infants were made under the fluoroscope and with plates. The empty stomach was observed first as far as possible, then various preparations of liquid and semi-solid foods were fed and the reaction followed. Various types of stomachs react differently to ingested food and individual types respond differently to different concentrations of food. The peristolic function was found in the infant stomachs. It was not evident when liquid food was taken but became apparent when solid food was introduced. It must be remembered that certain foods, such as a thick flour and milk preparation, become liquid on the influence of the body heat and saliva, while other preparations, such as thick potato pap, are not influenced by these factors.

In the roentgen-ray picture, stomachs containing liquid food resolve themselves into two types, the "flask" type and the "oval" or "ellipsoid" type. With semi-solid pulpy or pap foods both forms of stomachs assume a round or oval shape and are reduced to one-third of their previous size. The "air bubble" disappears. The beneficial action of pap or thick, semi-solid foods in habitual vomiting and pylorospasm may be ascribed to excitation of the peristole.

THE INFLUENCE OF PHYSIOLOGIC NUTRITION ON THE WEIGHT AND CHEMICAL COMPOSITION OF THE LIVER AND TOTAL ORGANISM OF GROWING DOGS. P. JONEN, Ztschr. f. Kinderh. **38**:46, 1924.

In young dogs from well nourished mothers the liver weighed 5 per cent. of the total weight. The smaller percentage weight of the liver in adult dogs is due to the loss of water. The liver of dogs at birth has a glycogen content of 4.36 per cent. The amount of protein, glycogen and fat in young animals is greatly influenced by the nutritional condition of the mother. Therefore, the birth weight of infants is of value. In a three weeks old breast fed dog the liver was relatively smaller than the average birth weight. In one undernourished dog (breast fed) the relative liver weight was 2.74 per cent., the glycogen 0.66 per cent. with a markedly diminished water content. One undernourished suckling was fed cow's milk. The liver later showed a high fat content. The histologic pictures show the fat deposits inside the liver lobules while the glycogen is generally distributed.

PETERMAN, Rochester, Minn.

Pathology, Bacteriology and Biochemistry

THE WASSERMANN TEST. DAVID BELDING and ISABELLE HUNTER, Am. J. Obst. & Gynec. **8**:22, 1924.

The report covers observations on 461 women with positive signs of syphilis and 500 with negative signs.

The authors draw some very interesting conclusions summarized as follows:

1. In 25 per cent. of the definitely syphilitic cases proof of clinical syphilis was obtained only from the child.
2. Over one-third or 37.5 per cent. of fetal deaths in women with a positive Wassermann test are directly or indirectly due to syphilis.
3. There is a 6 per cent. increase in early infant mortality in syphilitic persons.
4. The percentage of infant mortality is much higher in cases with strong positive or clinical syphilis, in hospital cases running from 54 to 82 per cent.
5. Only 40 per cent. of positive Wassermann tests show clinical syphilis. These figures are markedly increased (12.6 per cent.) by the evidence of syphilis present in the child.
6. From 25 to 30 per cent. of pregnant women with a positive Wassermann test are nonsyphilitic.
7. Clinical syphilis is 2.1 times more frequent in the negro than in the Jew.

ALLEN, Chicago.

THE ACTION OF EPINEPHRIN, PITUITARY AND THYROID EXTRACTS ON THE REACTION OF BLOOD IN INFANTS. G. MACCIOTTA, Pediatria **32**:712 (June 15) 1924.

Macciotta determined that epinephrin diminished the alkalinity of the blood but that this was only temporary. Thyroid had the same effect as epinephrin, only more marked. Pituitary extract increased the alkalinity of the blood.

DE SANCTIS, New York.

THE CALCIUM CONTENT OF THE BLOOD IN PATHOLOGIC CONDITIONS. IRENE KOECHIG, J. Lab. & Clin. Med. **10**:679, 1924.

The author found in thirty-five pathologic conditions that the calcium content of the blood plasma did not differ from the normal values, which appear to lie between 9.5 and 11.0 and averaging 10.3 gm. per hundred cubic centimeters of plasma. Low results were found in rickets, tetany, nephritis, colitis, pellagra, jaundice and osteomalacia, while high results were found in Paget's disease and a pathologic fracture. A series of calcium determinations were made in the case of an adult epileptic patient with tetany over a period of three months. The values found on different days varied from 6.4 to 10.9 mg., the low values being obtained in the tetany periods. As a therapeutic measure 10 c.c. of a 5 per cent. calcium chlorid solution was injected intravenously. Within half an hour the calcium content of the plasma rose to the high point of 11.8 mg. of calcium per hundred cubic centimeters of plasma but at the end of half an hour returned to normal. The author believes that the low content associated with tetany is due to factors other than a mere insufficient supply. This study showed that the intravenous injection of calcium is not effective in producing and maintaining an increased amount of plasma calcium.

SHAW, Albany.

Nutrition

FIXED PRINCIPLES IN THE FEEDING OF INFANTS. F. M. FRY, Canad. M. A. J. **14**:503 (June) 1924.

The author reviews briefly the changing viewpoints in infant feeding from Rotch's time to present and protest against the following of fads and

fancies. His conclusions are that each case is an individual problem and must be studied from the standpoint of adapting the food to the particular child at hand.

There are no new ideas as to the general principles involved.

MOORE, Omaha.

WATER ECONOMY STUDIES IN HYDROLABILE CHILDREN. WALTER BLOCK, Ztschr. f. Kinderh. **38**:22, 1924.

Seven hydrolabile children (exudative, and so forth) and twenty-five normal children were studied. The ages ranged from 8 to 32 months. The subjects were given a diet poor in salt and carbohydrates. The hydrostable children maintained the water balance well following the intake of fluid, while the hydrolabile children reacted quite differently. When the hydrostable child is given 200 c.c. of tea, his curve of excretion (urine and insensible perspiration) runs as follows: first hour, 90 c.c.; second hour, 10 c.c.; third hour, 40 c.c.; fourth hour, 30 c.c.; fifth hour, 30 c.c. The hydrolabile child excretes 140 c.c. first hour; 135 c.c. second hour; 110 c.c. third hour; 60 c.c. fourth hour; gradually dropping to zero in the fifth hour.

Complications, such as fever, markedly influence the curve and, hence, must be ruled out. The urine was collected at hourly intervals for five hours. The insensible perspiration was calculated from the hourly difference in weight minus the urine excreted. The hydrolabile children excreted from 225 to 260 per cent. of the intake, while the hydrostable children excreted from 135 to 160 per cent. The renal and extrarenal secretions vary in relation to each other with every hydrolabile child. The water output of hydrolabile children is far above the output of normal children.

Studies were also made on the excretion of water following the administration of fluids with sugar and salts. The combined water and sugar mixtures show little difference between the two types of children. With whole milk alone, the hydrolabile children excreted 128.5 per cent. and the hydrostable children 135 per cent. If sugar is added to the whole milk, the excretion in the hydrolabile patients drops to 64 per cent. while in the normal the excretion drops to 115 per cent.

PETERMAN, Rochester, Minn.

BLOOD SUGAR IN HUNGER AND THE GLYCEMIC REACTION AFTER SMALL DOSES OF SUGAR IN INFANTS AND SMALL CHILDREN. FRANZ RUMPF, Jahrb. f. Kinderh. **105**:321, 1924.

The blood sugar from four to six hours after a meal varies from 0.076 per cent. in infants to 0.095 per cent. in youths, and decreases the longer the fast. The more carbohydrate is given, the greater and longer the hyperglycemic reaction. The same amount of dextrose causes a greater hyperglycemia the older the person. The smallest amount of dextrose per kilogram of body weight, which would cause an alimentary hyperglycemia was 1.3 gm. in infants, 0.7 gm. in small children, and 0.3 gm. in adults. After subcutaneous injection 0.3 gm. caused a definite hyperglycemic reaction in infants as compared to 1.3 gm. by ingestion. The subcutaneous injection is subject to less error.

SUTHERLAND, Chicago.

EXPERIMENTAL RICKETS AND CALCIUM METABOLISM. H. ISCOVESCO and L. PAPILLAUD, Arch. Pediat. **41**:329, 1924.

An experiment is reported in which calcium chlorid solution was added to fresh horse serum in test tubes and carbonic acid gas was bubbled through the mixture. Calcium carbonate in colloidal suspension was formed almost instantaneously, and this suspension remained after forty-eight hours except in the

tube to which the largest amount of calcium chlorid had been added (1 c.c. of a 25 per cent. solution). In summing up, it may be said that for the purpose of finding a remedy for inadequate assimilation or of compensating excessive losses of calcium, it is not sufficient to administer an indefinite calcium mixture, whether phosphated or not, but it is required that the mixture conform to certain chemical and physicochemical conditions which are well defined, and that simultaneously a liposoluble vitamin be administered such as is found in cod liver oil or in the liver lipoid.

THE DANGERS OF CONSERVATISM IN INFANT FEEDING. C. F. FISHER, Arch. Pediat. **41**:413, 1924.

The desirability of breast feeding, supplemented at five months with vegetable soup, orange juice and cod liver oil is emphasized. Egg should be added at about the same time. The artificially fed infant should be given cod liver oil and orange juice from birth, especially premature infants. The question of calories is not a practical one and every infant should receive sufficient food to enable it to grow normally, even if 200 or more calories per kilogram of body weight are necessary to accomplish this. Partial weaning at the age of 6 months, with the addition of cereals, eggs, meat or liver, beef juice and well strained vegetable soup is recommended. Breast feeding should never be continued beyond twelve months. The author is opposed to high dilutions of cow's milk and advocates whole cow's milk without any dilution in selected cases.

VON MEYSENBUG, New Orleans.

THREE CASES OF DEATH IN NURSLINGS FOLLOWING ASPIRATION OF THICK CEREAL. REINHOLD RÜHLE, Monatschr. f. Kinderh. **28**:233, 1924.

That the increasing use of thick cereal is not absolutely without danger, the writer proves by quoting three cases. In two of these, death was sudden and unexplainable until the necropsy, which showed that the child had vomited some of the cereal and aspirated it into the lungs with resulting asphyxia. In the third case, the findings were those of an afebrile pneumonia with death on the fourth day, necropsy showing cereal in the finest bronchioles.

The reviewer wonders if cases like this have occurred in America and, due to lack of postmortem examination, been overlooked.

GERSTLEY, Chicago.

THE AMINO-ACID METABOLISM OF INFANTS IN HUNGER AND IN EXCESS PROTEIN FEEDING. F. GOEBEL, Ztschr. f. Kinderh. **38**:27, 1924.

The infant excretes in the urine a larger amount of its nitrogen as amino-acids than older children and adults, the fraction being 4.62 per cent. in infants and 1.85 per cent. in older children. In 81 per cent. of premature infants, studied by Goebel, the amino-acid fractions ranged from 9.5 to 25.5 per cent. The amino-acid nitrogen of the blood is not higher in infants. The new-born infant has a low amino-acid fraction which does not rise until the end of the first week.

An opportunity was presented to study an infant during starvation. The child was born with an atresia of the esophagus. On the fourth day of life, after seventy-two hours of starvation, the animo-acid nitrogen in the blood was 46 mg. and the urea nitrogen 21 mg. per hundred cubic centimeters. The amino-acid fraction in the urine (a ten hour specimen on the same day) was 24.65 per cent. with a total nitrogen content of 412 mg. per hundred cubic centimeters of urine. Two grams of glycocoll were injected into the sinus and forty-five minutes later the blood showed 22 mg. of amino-acid nitrogen. The urine for six hours after injection showed a rise in the amino-acid fraction to 36.98 per cent. with a total nitrogen of 438 mg. per hundred cubic centimeters of

urine. These findings following glycocoll injection would indicate a diminished ability for deamidization under the influence of starvation.

Three chldren were now fed an excess of protein. The following results were obtained:

Case	Mg. Amino-acid Nitrogen in 100 c.c. blood	Mg. urea Nitrogen in 100 c.c. blood	Mg. total Nitrogen in 100 c.c. urine	Mg. Amino-acid Nitrogen in 100 mg. total N
1.....	15	21	161	10.6
2.....	15	27	97	6.25
3.....	17	17	384	5.65

Then, with the fat of the whole milk replaced with equi-caloric amounts of a casein food preparation, the following values were found.

Case	Mg. Amino-acid in 100 c.c. blood	Mg. urea Nitrogen in 100 c.c. blood	Mg. total Nitrogen in 100 c.c. urine	Mg. Amino-acid Nitrogen in 100 mg. total N
1.....	25	43	1695	2.5
2.....	15	34	860	3.95
3.....	10	20	1526	3.49

PETERMAN, Rochester, Minn.

Diseases of the New-Born

A POSSIBLE FACTOR CONTROLLING THE WEIGHT OF THE NEW-BORN. RELATIONSHIP OF THE AREA OF THE PLACENTA TO THE BIRTH WEIGHT OF THE CHILD BASED ON OBSERVATIONS IN ONE HUNDRED CASES. RAE THORNTON LAVAKE, Am. J. Obst. & Gynec. **8**:99, 1924.

The author demonstrates a direct proportion between the birth weight and the area of the placenta. He thinks that this substantiates the idea of the futility of cutting the diet in pregnancy to control birth weight, also advancing some interesting theories as to the causation of placenta praevia and ectopic pregnancy by the proteolytic energy of the ovum in digging in early or late.

NATURAL IMMUNITY IN THE NEW-BORN. LUTHER K. MUSSELMAN, Am. J. Obst. & Gynec. **8**:45, 1924.

The author chooses as his criterion of resistance or immunity the ability of the serums of mother and new-born to cause the death of pathogenic organisms rather than the variable methods of antibody content determination.

He checks his results by observations on the serums of men, nonpregnant women, and women in various months of pregnancy. Complement titrations were also made on mother and new-born.

The blood of the infant was obtained from the umbilical cord before the placenta had separated. The maternal blood was withdrawn at the same time. These were titrated against different dilutions of *B. typhosis* cultures in Wright's capillary tubes with dextrose Andrea broth.

His conclusions are that the maternal serum always has a much higher bactericidal action than the serum of infants.

No variation could be proved due to pregnancy in adults. He assumes that the bactericidal action is due to a deficiency of the antibody content of the serum of the new-born and not to an increased activity of the maternal serum.

ALLEN, Chicago.

IRON IN THE BLOOD OF THE NEW-BORN. C. GALLO, Pediatria **32**:607 (May 15) 1924.

Gallo found the iron in the blood of new-born infants to vary from 0.034 to 0.055 per cent. The average figures were lower than in adults. There was no direct proportion between the amount of hemoglobin and iron.

DE SANCTIS, New York.

THE ETIOLOGY OF HEMORRHAGE IN PREMATURE AND NEW-BORN INFANTS. ARVO YLPPÖ, Ztschr. f. Kinderh. **38**:32, 1924.

A simple suction cup apparatus to determine the functional capacity of the blood vessels in premature and new-born infants is described. With negative pressure in the suction cup it is easy to produce hemorrhage in the skin and subcutaneous tissues. The smaller the child at birth, the less negative pressure is required to produce hemorrhage. The greater the prematurity, the more friable and easily injured are the blood vessels.

PETERMAN, Rochester, Minn.

THE PATHOGENESIS OF ICTERUS GRAVIS NEONATORUM. WALTER HOFFMANN, Jahrb. f. Kinderh. **105**:155, 1924.

A case is presented in which the child had well developed icterus on the first day of birth. On the tenth day, there was bloody vomitus and bloody diarrheal stools, also enlargement of the liver and spleen, and bile in the urine. The serum showed prompt reactions by both the direct and indirect diazo test of Hymans. The icterus lasted eight weeks. The hemoclastic crisis indicated liver injury; the diazo tests showed both hemolytic and obstructive icterus, the latter also was shown by the presence of bile in the urine. The obstruction was considered to be catarrhal on account of the evidence of intestinal infection and the improvement of the icterus as the gastro-intestinal symptoms improved. The exudative lymphatic diathesis was also a factor in the catarrhal process.

SUTHERLAND, Chicago.

HEMORRHAGE OF THE NEW-BORN. FLOYD CLARKE, Arch. Pediat. **41**:343, 1924.

Hemorrhage of the new-born is more frequent than the early literature would lead us to believe. Blood coagulation and bleeding time tests should be performed as a routine. More necropsies should be done. Early surgical procedure and diagnosis may help in preventing some of these children from becoming hopelessly crippled and mentally deficient. The injection of whole blood is curative in hemorrhagic disease of the new-born.

Still of London recommends the use of gelatin by mouth, giving teaspoonful doses of a solution of 10 grains to the ounce.

VON MEYSENBUG, New Orleans.

Acute Infections

PROPHYLAXIS OF MEASLES BY INJECTION OF DEFIBRINATED ADULT BLOOD. HELMUT GERLACH, Monatschr. f. Kinderh. **28**:236, 1924.

The mortality from measles of children under 2 years of age is 28 per cent. in contrast to 4.8 per cent. in older children. The use of convalescent serum as recommended by Degkwitz, has been very successful, but it is not possible to get the serum in all cases.

In cases where convalescent serum has not been obtainable, the use of adult serum in doses of from 20 to 30 c.c. has been moderately successful. The

writer, in order to make full use of the adult blood, used the entire defibrinated mass; i. e., the blood being allowed to run into a sterile dish, beaten with a glass rod, and immediately after coagulation, injected. The author maintains that with this method only 10 per cent. of the blood is lost against 40 per cent. by other methods. In doses of from 20 to 40 c.c., this preparation was very successful in preventing the development of measles after exposure.

DIATHERMIC TREATMENT OF INFANTILE PARALYSIS. HUGO PICARD, Monatschr. f. Kinderh. **28**:242, 1924.

The treatment of infantile paralysis up to the present has been divided into two classes.

1. The treatment against the primary disease.
2. Secondary treatment for the deformities.

The secondary treatment has been the one most emphasized. The writer, following a publication by Bordier, attempted a primary treatment by means of diathermy, the electrodes being placed one on the back and one over the affected extremity. This treatment did not bring the heat directly through the spine; so he attempted passing a current directly through the affected segment of the spinal cord. The dosage in transverse direction was from 1.1 to 1.4 amperes, and longitudinally, from 0.9 to 1.1. Treatment was started as soon as possible, the duration was fifteen minutes, and the entire treatment was continued for two months.

The author then gives a series of protocols, claiming to show that the results of this treatment are more satisfactory than those of any other treatment employed up to the present, especially when the treatment is started early.

Interesting is it that the treatment is far more successful in children than in adults, probably due to the greater density of the vertebrae in the latter.

GERSTLEY, Chicago.

ETIOLOGY OF SCARLET FEVER. I. NASSO and L. AURICCHIA, Pediatria **32**:654 (June 1) 1924.

Nasso and Aurichia have isolated and cultured an organism from the blood, nasopharynx, urine, bone medulla and desquamation of scarlet fever patients. This organism is identical morphologically and serologically with the organism described by Cristina and Caronia. The organism described is a gram-positive, round or slightly oval coccus; occurring either singly or in pairs. Inoculation of young rabbits with this organism causes a condition which is analogous to that produced in the same animal by inoculation direct from a scarlet fever patient.

INTRADERMAL REACTION IN SCARLET FEVER. DE VILLA, Pediatria **32**:665 (June 1) 1924.

De Villa performed intracutaneous tests using Cristina's cultures. The reaction was positive in 51 per cent. of the children without history of scarlet fever and doubtful in 14 per cent. It was positive in only 4.3 per cent. of those who had had scarlet fever previously. It was negative in the acute stage of scarlet fever, during convalescence, in babies during the first six months of life and in those children vaccinated against scarlet fever.

ACUTE ARTICULAR RHEUMATISM. M. SINDONI and G. VITETTI, Pediatria **32**: 697 (June 15) 1924.

Sindoni and Vitetti have been able to isolate and culture an organism from the blood, articular exudate, urine and cerebrospinal fluid of patients with acute articular rheumatism. They describe the organism as a small gram-

positive micrococcus, occurring singly or in pairs. Articular exudate or blood of acute rheumatic patients injected intravenously into young rabbits cause a condition characterized by fever, inflammation of the serous cavities and very often death of the animal. From the blood of the injected rabbits an organism was recovered which corresponded exactly to that isolated from the patient.

BLOOD SUGAR IN INFANTILE LEISHMANIOSIS. L. AURICCHIA, Pediatria **32**:704 (June 15) 1924.

Auricchia found the blood sugar invariably increased in infantile leishmaniosis. The sugar varied from 0.134 to 0.264.

MENINGITIS IN INFANCY CAUSED BY THE BACILLUS OF PFEIFFER. M. GERBASI, Pediatria **32**:600 (May 15) 1924.

Gerbasi draws the following conclusions. 1. That influenzal meningitis is rather common in infancy, runs a rapid course and is almost always fatal. 2. That the organism recovered from the spinal fluid is identical with that causing respiratory influenza. 3. That this form of meningitis from the etiologic standpoint is distinct from that caused by the streptococcus. 4. That the case reported was secondary to a respiratory influenza.

LEUKOCYTOSIS IN PERTUSSIS. O. COZZOLINO, Pediatria **32**:761 (July 1) 1924.

Cozzolino considers the leukocytosis in pertussis as of infectious origin, and states that the disease is contagious as long as the leukocytosis exists.

INTRADERMAL REACTION IN MEASLES. S. DE VILLA, Pediatria **32**:769 (July 1) 1924.

De Villa performed intracutaneous tests, using Caronia's cultures. They were negative in 75 per cent. of the children tested who previously had measles and in 83 per cent. of the children tested who had been vaccinated against measles. The reaction was positive in 68 per cent. of the children tested who had not had measles. He concludes that the intradermal test in measles is of decided value, giving a negative reaction in most children who had measles and in those who had received the measles vaccine. It gives a positive reaction in those children who had not had measles. He adds that this is further proof that the organism described by Caronia is the specific cause of measles.

DE SANCTIS, New York.

MEDICAL DIATHERMY IN PNEUMONIA OF CHILDREN. T. B. LACEY, J. Radiol. **5**:200, 1924.

A favorable report is made on the use of diathermy in children. The treatments were given twice daily. The milliamperage was zero for the first minute, increasing 100 milliamperes each minute until there was complaint from the patient. This proved to be about 200 milliamperes per year of age. The maximum milliamperage was continued for ten and not over fifteen minutes. The patients were observed closely during the treatment for unfavorable signs. This was reported in only one patient, a fall in pulse rate and blood pressure necessitating stimulation. The patient recovered although no further treatments were given. Complete data as to the number of cases treated and their courses are not reported. The statement is made that diathermy shortens the course of pneumonia in children.

CHAMBERLAIN, Chicago.

THE SPECIFIC ASPECTS OF SCARLET FEVER. RUTH F. CRABTREE, Arch. Pediat. **41**:363, 1924.

The author reviews the experimental and clinical investigations of scarlet fever to date. It appears that scarlet fever is an infectious disease, caused by a specific strain of hemolytic streptococcus that produces an exotoxin which is responsible for the fever, delirium and rash and which, when injected into a horse or into a human being, produces specific antitoxic bodies. We also have a reliable skin test for the susceptibility of a person to scarlet fever (the so-called Dick test); a test for the differential diagnosis of scarlatina from other erythematous rashes; and a specific antitoxic serum for therapeutic use.

THE SPECIFIC ASPECTS OF MEASLES. B. I. ASHE, Arch. Pediat. **41**:375, 1924.

A review of experimental work on measles. The diplococcus of Tunnicliff and Moody, the bacillus described by Sellards and Bigelow and the long suspected filterable virus are considered in turn as causative agents. While no specific organism has as yet been isolated, the disease behaves as does an infectious disease, in that active immunity has been produced by inoculating infants with the nasopharyngeal washings from measles patients and passive immunity can be conferred by the use of convalescent serum.

THE CLINICAL VALUE OF THE ROUTINE EXAMINATION OF BLOOD SMEARS IN THE DIAGNOSIS OF PERTUSSIS: A REPORT OF THREE HUNDRED CASES. HENRY HEIMAN, Arch. Pediat. **41**:385, 1924.

The results of the examination of blood smears in 300 cases of pertussis are presented to emphasize the almost constant occurrence of lymphocytosis as a useful aid in the early detection of this infection.

INFECTION BY MICROCOCCUS MELITENSIS. L. CAMOUS, Arch. Pediat. **41**:396, 1924.

A description of malta fever with its epidemiology, symptomatology and treatment is given, together with three case reports. The micrococcus melitensis is transmitted to man by infected goats, usually through their milk, but also by direct contact and by mosquitoes and flies. The micrococcus is found in the blood and urine of infected patients and may be demonstrated in blood smears. The patient's serum agglutinates the organism. Treatment consists in the use of quinin.

RAT BITE FEVER. AUGUST STRAUCH and B. G. BISSEL, Arch. Pediat. **41**:315, 1924.

The authors detail the geographical distribution, etiology, symptomatology, diagnosis, prognosis and treatment, together with the report of a case of a child treated at the Cook County Hospital.

REPORT OF AN OUTBREAK OF POLIOMYELITIS IN A CHILD CARING INSTITUTION. MAX W. BLOOMBERG and L. H. BARENBERG, Arch. Pediat. **41**:339, 1924.

Ten cases of poliomyelitis occurred in an institution housing 300 children. All children were in wards isolated from contact with the outside; all had fever, pain and tenderness and in eight patients the right shoulder and arm were involved. The lumbar puncture findings did not prove pathognomonic: the pleocytosis did not always coincide with the increase in pressure, nor did either correspond to the severity of the paralysis, there apparently being no definite inter-relationship. The authors conclude that: (1) the disease is only mildly infectious; (2) there are so-called "abortive cases," cases without paralysis; (3) in the preparalytic stage the disease greatly resembles grippe; (4) no form of treatment was necessary except avoiding all unnecessary handling.

AN EARLY DIAGNOSTIC SIGN IN MEASLES. I. H. GOLDBERGER, Arch. Pediat. **41**:427, 1924.

The author describes certain spots, similar to, yet smaller than, Koplik's spots, which appear on the swollen caruncle at the internal canthus of the eye. These spots can be seen from twenty-four to forty-eight hours before Koplik's spots appear, and in many cases they have been observed forty-eight hours prior to the onset even of catarrhal symptoms. In the pre-eruptive stage these spots appear isolated, pin-point in size, from two to four in number and are bluish white in color. During the eruptive stage they tend to coalesce. Unlike Koplik spots these eye spots do not disappear with the appearance of the rash. This eye sign has not been observed in any other of the exanthems.

TREATMENT OF PERTUSSIS WITH INTRAMUSCULAR INJECTION OF ETHER. C. C. MASON, Arch. Pediat. **41**:429, 1924.

Twenty-six cases of pertussis were treated. On the first day of treatment two injections of 0.5 c.c. were given; on the second day, two injections of 1.0 c.c. each; third day 1.5 c.c., two injections; fifth day, one injection of 2 c.c.; each day thereafter one injection of 2 c.c. Of twenty-six cases, sixteen stopped whooping after eight injections and did not cough again, six were definitely benefited; in four cases the course of the disease was not altered. The injections were made with a long, fine platinum needle, deep into the buttocks.

VON MEYSENBUG, New Orleans.

ON THE IMMUNIZATION AGAINST DIPHTHERIA BY DIPHTHERITIC ANATOXIN. H. DARRÉ, G. LOISEAU and A. LAFFAILLE, Bull. et mém. Soc. méd. d. hôp. de Paris **48**:729, 1924.

This is a careful experimental study of the effect of injections of diphtheritic anatoxin on the antitoxic power of the blood in a small series of adults and children. Anatoxin is the name given by G. Ramon to the toxin of the diphtheria bacillus deprived of its toxic but not of its antigenic power by the action of heat and a solution of formaldehyd. Schick tests were made, as well as measurements of the antitoxic power of the blood.

The results were considered satisfactory in that the Schick tests became negative, even after a delay of two to three months, and the antitoxic power of the blood was increased. This increase was particularly striking in those subjects who already had a negative Schick reaction; while in those who had a positive Schick reaction, the increase in antitoxic power was much slower, and less in degree but still appreciable. Little can be said of the results in patients convalescent from diphtheria, who had received antitoxin several weeks before, except that they are not very striking. The authors are fully aware that they have not observed their subjects over a sufficiently long time to draw conclusions as to the permanency of the increase in antitoxic power of the blood.

VACCINATION OF ADULTS WITH DIPHTHERITIC ANATOXIN. ZOELLER, Bull. et mém. Soc. méd. d. hôp. de Paris **48**:644, 1924.

M. Zoeller attempted to produce active immunity to diphtheria in a series of fifty-nine adults with positive Schick reactions by injections of anatoxin (diphtheritic toxin treated with heat and solution of formaldehyd). A few of the subjects acquired a negative Schick reaction after only one injection, but most required two or three injections for the production of this result, none requiring more than three. Since the patients were not followed after the last injection and subsequent Schick test, the duration of this immunity is not known. None of the injections were followed by untoward reactions. A single

instance of the use of anatoxin, in addition to large doses of antitoxin in a man severely ill with diphtheria, followed by recovery, is hardly sufficient evidence of its value.

THE IMMUNIZATION OF CHILDREN AGAINST DIPHTHERIA WITH DIPHTHERITIC ANATOXIN. J. ROUBINOVITCH, G. LOISEAU and A. LAFAILLE, Bull. et mém. Soc. méd. d. hôp. de Paris **48**:782, 1924.

This is the first report on an attempt to immunize a series of children and young adults against diphtheria with diphtheritic anatoxin under conditions favorable for following the immunization over a long period of time. The patients to be immunized were inmates of institutions for deafmutes and for mentally backward children.

Of 130 children having a positive Schick reaction, 37 per cent. were immunized after one injection of anatoxin; of fifty-one children whose Schick reaction remained positive and who underwent a second injection 81 per cent. acquired a negative Schick reaction. After a third injection eighty-four out of eighty-five children had been immunized. Local reactions consisting of induration, local adenitis and once of widespread erythema were experienced. A rise of temperature occurred after some of the injections.

JOSEPHS, Baltimore.

Chronic Infections

TUBERCULOSIS OF THE MESENTERIC LYMPH NODES WITH REPORT OF AN UNUSUAL CASE. H. R. MIXSELL and C. E. FARR, Arch. Pediat. **41**:402, 1924.

An interesting case of tabes mesenterica in an infant, aged 19 months, which throve under rest and heliotherapy and later came to operation for acute intestinal obstruction due to bands of adhesions. Large caseating glands were found retroperitoneally at operation, microscopic examination of which confirmed the diagnosis. The child recovered and continued to improve with rest, heliotherapy and tonics.

VON MEYSENBUG, New Orleans.

Internal Diseases

CONGENITAL MEGACOLON. A. DALLE VALLE, Pediatria **32**:569 (May 15) 1924.

Dalle Valle reports a case of congenital megacolon with necropsy findings in the brother of a similar patient whose history he had previously reported. The necropsy findings were hypertrophy and hyperplasia of the circular muscular tissues and absence of nervous tissue in the sigmoid flexure of the colon. In mild cases his treatment consisted of enemas, cathartics and the use of epinephrin, pilocarpin, physostigmin or atropin. In severe cases he resorted to surgery. He concludes that the condition is a congenital one, the muscular hypertrophy being primary. The prognosis is bad, very few of these patients reaching adult life.

PERSISTENT VOMITING AND PYLOROSPASTIC SYNDROME IN INFANTS. A. BORRINO, Pediatria **32**:634 (June 1) 1924.

Borrino concludes that habitual and persistant vomiting is a frequent condition in breast fed infants as early as the first week of life. Very often this condition develops into a true pylorospastic syndrome which responds to medical treatment.

Borrino found the administration of undiluted cow's milk useful in small amounts in certain cases before every breast feeding.

DE SANCTIS, New York.

EPIDEMIC PLEURODYNIA. DAVID GREENE, Arch. Pediat. **41**:322, 1924.

An epidemic disease, which, because of its symptomatology, may best be called epidemic pleurodynia is described. The condition is characterized by the sudden onset of pain in the chest or upper part of the abdomen, fever and moderate prostration. Its etiology and nosology cannot definitely be stated. There are, however, several features of the disease, its epidemicity, abrupt onset, cyanosis, from one to three days fever, leukopenia and moderate prostration, which somewhat resemble influenza. On the other hand, the acute pain in the chest, which was the most striking symptom, and the absence of generalized aches and pains and the absence of an inflamed nasopharynx are atypical of influenza.

DIABETES IN CHILDREN. GLADYS L. BOYD, Arch. Pediat. **41**:291, 1924.

The author considers the etiology, pathology, symptoms, diagnosis, prognosis and treatment in a series of thirty-two cases. In 56.2 per cent. of these, infection was responsible for the onset of the disease, while heredity was a factor in only 0.09 per cent. In the fatal cases at necropsy there was found no gross pathologic change in the pancreas, but there was hydropic degeneration of insular tissue, also a striking paucity in the number of islands.

The symptoms are the same as in the adult but more acute, coma supervening quickly. In general, the higher the blood sugar the more severe the disease. Before insulin was discovered, the prognosis was hopeless; now the outlook depends largely on the care given and the fidelity to treatment. Treatment consists of (1) diet; (2) insulin; (3) medicinal.

AN ANATOMICAL CAUSE FOR ENTEROPTOSIS AND THE V COLON. E. M. MOSHER, Arch. Pediat. **41**:422, 1924.

The author has observed in cases of enteroptosis and V colon a shortened sternum, thus giving a long sternopubic diameter, with resultant weakening of the recti muscles. She recommends widening of the costal angle by proper exercises. When exercises fail, a belt must be worn to support the abdomen on its median line.

VON MEYSENBUG, New Orleans.

THE ENLARGED THYMUS GLAND. W. F. DREA, Radiol. **5**:193, 1924.

An enlarged thymus may be present and produce slight symptoms; these cases are often overlooked unless the roentgen ray is used. The author suggests that anterior-posterior enlargement may be present with little lateral extension. In these the usual roentgen ray film would show no thymic shadow, although the clinical evidence was present. The presence of enlarged paratrachael glands may cause a confusing shadow. However the glands frequently are enlarged on one side only. Radiation with roentgen ray or gamma rays is beneficial in either case. The effect is more rapid on the thymus than on enlarged paratrachael glands. The author, unless the severity of the case demands more intensive treatment, gives four roentgen-ray treatments at one or two week intervals, using 5 milliampere 8 inch spark gap, 10 inch skin target distance, 3 mm. Al. screen, and about two and one-half minutes exposure. The milder treatment is used in the belief that absorption is less rapid, and suppression of function less abrupt, although the latter is unknown. Heavier dose may be safely given and both front and back of the chest exposed. The thyroid should be protected during the exposure. Films are taken to advantage as they record the process of involution, which may extend over a considerable period after the last treatment is given.

CHAMBERLAIN, Chicago.

THE PATHOGENESIS OF MORBUS MACULOSUS WERLHOFII. ALBERT MEYERSTEIN, Ztschr. f. Kinderh. **38**:11, 1924.

A necropsy study of a case of essential, intermittent thrombopenic purpura hemorrhagica is reported. The literature is reviewed, theories regarding etiology are cited, and the following observations are made on seventy-six cases of morbus maculosus werlhofii reported in the literature and six cases seen in the Kinderkrankenhaus in Berlin.

Sixty-four cases were in girls and eighteen in boys. The symptoms were manifest from early childhood, often when the patient was learning to walk. The majority of cases had their onset between the ages of 4 and 14. The earlier onsets usually followed acute infections. Familial tendencies were marked. The blood platelets were usually low, especially at the onset, the bleeding and retraction time prolonged, the coagulation time varied. The blood picture was not definite. The course of the disease was always progressively worse. In four cases there were found ovarian tumors, in one case genital hyperplasia, and in two cases precocious sexual development. In the case cited splenectomy was done, but rather late in the disease and the patient died six hours after operation.

PETERMAN, Rochester, Minn.

ENDEMIC GOITER AND CRETINISM. M. PFAUNDLER, Jahrb. f. Kinderh. **105**:223, 1924.

There is a parallel between the content of radioactive substances in water and endemic goiter. The known facts support the theory that such substances are an important etiologic factor, but are insufficient either to prove or disprove it. There is a close correlation between endemic goiter and cretinism, not only in the same person but between mother (goiter) and child (cretinism). In addition to the external factors there are internal factors. There is the true hereditary factor in which goiter and cretinism act as simple recessives, and also the inability of the mother during pregnancy to furnish proper protection to the developing anlagen.

GAUCHER'S SPLENOMEGALY IN INFANCY. MAX RABER, Jahrb. f. Kinderh. **105**: 277, 1924.

None of the cases reported previously has occurred in infancy. The author reports two cases, sisters, in whom the symptoms were first noted at the age of 5 months. Both died before 10 months of age. The diagnosis at necropsy was made by the presence of Gaucher cells in the spleen.

PERNICIOUS ANEMIA AND PERNICIOUS-LIKE ANEMIAS IN CHILDHOOD. A. HOTZ, Jahrb. f. Kinderh. **105**:161, 1924.

True pernicious anemia is rare in childhood, though several observers have described a pernicious blood picture in nutritional and gastro-intestinal disturbances. Three cases are presented, one a true pernicious anemia of unknown etiology, and two having a pernicious blood picture in children with Herter's disease. The latter had a typical blood picture of secondary anemia before and after the period showing a pernicious picture. This patient also had a high grade arteriosclerosis.

DIFFUSE OSTEOSCLEROSIS IN CHILDHOOD. GERTRUD NADOLNY, Jahrb. f. Kinderh. **105**:212, 1924.

A case report, the diagnosis being based on roentgen pictures and necropsy findings. The child was aged 4 months. The costochondral changes were especially interesting because superficially they simulated a rachitic rosary. There was a high grade anemia with a leukocytosis of 62,000, more than half

being small and large lymphocytes. The red cells showed marked anisocytosis, and polychromatophilia, and many normoblasts and megaloblasts. There was spleen and liver enlargement. The bones showed replacement of spongy by compact substance infringing on the medullary canal. The author considers the disease one of calcium metabolism without known etiology. The endocrine glands were normal.

SYMPTOMS OF CIRCULATORY INSUFFICIENCY IN CHILDREN. E. SCHIFF, Jahrb. f. Kinderh. **105**:341, 1924.

In acute heart disease, the collapse reaction is due to infectious injury of the vascular system. In chronic valvular defects the edema and cyanosis are the result of weakness of the heart muscle. This enables one to distinguish acute from chronic heart disease.

CONGENITAL HEMOLYTIC ICTERUS. ALFRED RESCH, Jahrb. f. Kinderh. **105**:301, 1924.

The author presents three cases, one in considerable detail, of a brother, a sister and a cousin. There was no evidence of the condition among the parents or grandparents. The mechanism of the heredity cannot be definitely determined without further data.

SUTHERLAND, Chicago.

HEMOLYTIC ICTERUS IN A CHILD. BECK, Monatschr. f. Kinderh. **28**:215, 1924.

Innumerable publications in recent times have discussed hemolytic icterus in adults, but so far there have been relatively few descriptions of this clinical picture in nurslings. Beck describes a case in a breast fed infant, aged 5 months. In spite of the breast feeding, the child showed marked rickets. There were only 1,600,000 red cells, 4,000 white cells of which 70 per cent. were lymphocytes. The spleen and liver were enlarged. In spite of the anemia there were no heart findings until the seventh month when a loud murmur appeared. The blood serum contained much bilirubin and no urobilin nor urobilinogin. The icterus got worse and the child gradually declined until an operation for removal of the spleen was undertaken, when improvement became marked.

The author then describes two cases in older children associated with oxycephalus, and calls attention to some apparent relationship between the two conditions.

CASE OF PSEUDOHEMOPHILIA. E. BRECKOFF, Monatschr. f. Kinderh. **28**:232, 1924.

The author reports a case which looked clinically like hemophilia. The hemoglobin was 35 per cent. with 3,000,000 red blood cells. A wound of only 3 mm. in depth bled for forty-eight hours, and the blood did not coagulate in a week. By various tests, that is, by treating the patient's blood (1) with normal serum, (2) with calcium chlorid, (3) with defibrinated normal serum and (4) with magnesium sulphate it was found that the source of the difficulty was due to a lack of fibrinogen.

Four days after a blood transfusion, the patient showed a marked improvement, bleeding time being five minutes and coagulation time twenty-five minutes.

Six weeks later coagulation time was markedly increased again, but the bleeding time remained normal, and the hemoglobin was 80 per cent.

BILOCULAR HEART WITH SITUS INVERSUS. OTTO CORSDRESS, Monatschr. f. Kinderh. **28**:193, 1924.

In a necropsy on a child, aged 4 months, with situs inversus, the heart was found to be three times as large as the fist. The heart lay for the most part

to the right of the midline. The interesting feature about this heart was that a situs inversus existed even in some of its parts. The body veins and the coronary vessels were associated with the left auricle, and the lung veins with the right. The inter-auricular septum had remained stationary at a former developmental stage. In the left auricle the tricuspid was entirely lacking, and from the right auricle one entered through the mitral orifice into the only ventricle. A tiny cavity just underneath the aortic opening was probably a rudimentary left ventricle.

The large vessels showed the transposition of situs inversus, namely, the aortic right and forward, and the pulmonary left and behind.

The article gives a diagrammatic sketch of the circulation. Clinically, the disease was a typical morbus ceruleus.

GERSTLEY, Chicago.

THE SIGNIFICANCE OF GLYCOSURIA. PHIL L. MARSH, J. Lab. & Clin. Med. **10**:663, 1924.

Glycosuria is not a disease but a symptom found in many conditions other than diabetes. Glycosuria patients may be divided into two groups, those in which the blood sugar is normal or diminished and those in which it is elevated.

The former condition is known as renal glycosuria and the diagnosis rests on (1) specimens of urine and blood collected simultaneously that show glycosuria with a normal or depressed glycemia, (2) no symptoms of diabetes, (3) the glycosuria must not parallel the carbohydrate content of the diet, (4) the patient must not later develop true diabetes mellitus.

Of the glycosurias accompanied by elevated blood sugar which are not true diabetes the author describes alimentary glycosuria, emotional glycosuria, glycosurias in certain neurologic disturbances, those associated with asphyxia from any cause, and those resulting from disturbance of the glands of internal secretion. This includes cases of hyperthyroidism and of exophthalmic goiter, hypersecretion of the posterior lobe of the pituitary, and hypersecretion of the adrenal glands. The latter is important from its clinical use as an antidote for insulin.

The author discusses diabetes mellitus and its diagnosis in some detail. He believes that all diabetic patients should be maintained in a sugar free state even if they are very mild or very severe cases, whether dietetic treatment alone is used or insulin employed as an aid to dietetic treatment. He believes the wise plan is to consider any glycosuria as diabetic until proved otherwise.

SHAW, Albany.

Neurology

CONTRIBUTIONS TO THE STUDY OF THE NEUROTIC CHILD. H. S. REICHE, Arch. Pediat. **41**:333, 1924.

The author is of the opinion that in fully 40 per cent. of cases with which the pediatrician meets, the neurotic element in the individual constitution plays a varying rôle, which, if neglected, must hamper or nullify all attempts to diagnose or, even more, to treat the disease. Three cases are cited which illustrate how a functional neurosis may be the underlying cause of an organic disturbance and how it produces a complex clinical picture. The best cure for the hypersensitivity of the neurotic child is to develop its social instincts by association with other children and by forcing it to rely on itself when in society. Even more important is the encouragement of interest in some activity.

AMAUROTIC FAMILY IDIOCY WITH REPORT OF A CASE IN A GENTILE. L. D. HOPPE and G. E. CLAY, Arch. Pediat. **41**:389, 1924.

A brief description of the history, etiology, pathology and clinical finding of amaurotic family idiocy is given. Attention is called to the rarity of the disease in any other than Jewish infants. A case is reported occurring in an infant of pure gentile descent.

VON MEYSENBUG, New Orleans.

MENINGEAL REACTIONS AND ACUTE SEROUS MENINGITIS IN CHILDHOOD. M. STOOSS, Jahrb. f. Kinderh. **105**:345, 1924.

Occasionally in the course of acute diseases, especially bronchopneumonia and influenza, there occur meningeal reactions. Stooss presents three cases which were apparently primary. There was increased pressure of the spinal fluid, and an increased albumin and cell count. Such cases are usually sporadic, but were more or less epidemic in Paris in 1910. In two of these three cases, there was a lymphocytosis suggesting a relationship to poliomyelitis. Lumbar puncture relieves the symptoms, which may be severe.

MASKED VARICELLA. E. WIELAND, Jahrb. f. Kinderh. **105**:367, 1924.

The author presents several abortive cases occurring in the course of an epidemic. These showed a tendency to have few small sized vesicles, and also a tendency to remain localized on the head.

SUTHERLAND, Chicago.

Diseases of the Nose and Throat

A BACTERIOLOGIC STUDY OF EXTIRPATED TONSILS. LOUIS A. JULIANELLE, J. Lab. & Clin. Med. **10**:699, 1924.

The author made a bacteriologic study of the different types of organisms cultivable from tonsils which had been removed on account of septic or hypertrophied conditions. His study included 147 patients. The material for culture was obtained from the depths of the crypts or from purulent foci after bisecting the tonsils with a sterile knife. The results were as follows:

Organism	Numerical Incidence	Percentage Incidence
Streptococcus hemolyticus	133	90.4
Staphylococci	92	62.5
Streptococcus viridans	46	31.2
M. catarrhalis	29	19.7
B. influenzae	25	17.0
Pneumococcus	13	8.8
B. mucosus	8	5.4
B. diphtheriae	6	4.0
Nonhemolytic streptococci	2	1.3

In eight instances pure cultures were obtained, seven were hemolytic streptococci and one was *Streptococcus viridans*.

SHAW, Albany.

Diseases of the Skin

MONGOLIAN SPOTS WITH ANATOMICAL DEFECTS. OTTO BRUCH, Monatschr. f. Kinderh. **28**:199, 1924.

Pigment formation depends on a specific intracellular oxidizing ferment. The recognition of this ferment and the pigment reactions have led to newer studies concerning the presence of mongolian spots in Europeans. Countless necropsies have shown these specific cells frequently found in the skin of the sacral region. These spots are not uncommon in the white races, particularly where there has been a mixture with mongolian stock, as in Austria. The writer reports a

carefully studied case of his own and concludes in agreement with other authors that the presence of these spots in a white person does not necessarily mean racial mixture, but is probably a bit of spontaneous atavism.

Again, the presence of these spots in cases with anatomic defects, such as mongolian idiocy, would suggest their being primarily related to injury of the germ plasm.

GERSTLEY, Chicago.

Surgery and Orthopedics

MIXED CELL SARCOMA OF KIDNEY IN CHILD ELEVEN MONTHS OLD. F. M. FRY, Canad. M. A. J. **14**:518 (June) 1924.

An interesting case history is presented of baby, aged 11 months, normal previous to entrance in hospital, the only complaint at entrance being a mass in the left side of abdomen. Examination showed a hard mass the size of a fist in the left upper quadrant. This mass was roughly quadrilateral and extremely hard and moved vertically with respiration. The mass was removed and microscopic examination showed it to be a mixed cell sarcoma. Recovery was uneventful.

Two and one-half years later the child returned with pleural effusion. No signs of metastasis could be found. Permanent relief was obtained by thoracentesis.

Twelve years later the child was examined and found in excellent health with normal kidney function.

MOORE, Omaha.

DIAPHRAGMATIC HERNIA IN A CHILD FOLLOWED FOUR WEEKS LATER BY ACUTE INTESTINAL OBSTRUCTION. M. BEHREND, Arch. Pediat. **41**:408, 1924.

The author's conclusions are that diaphragmatic hernia in children is rare, only seven patients having been operated on to date. Roentgen ray is most useful in making the diagnosis. In operating, the abdominal route may be the only necessary one. In the case reported the predisposing cause was undoubtedly an empyema operated on five months before the symptoms of intestinal obstruction began, due to a band of the great omentum wrapped around the ileum. The child made an excellent recovery after operation.

VON MEYSENBUG, New Orleans.

Miscellaneous

CHILD GUIDANCE CLINICS. G. S. MUNDIC, Canad. M. A. J. **14**:508 (June) 1924.

A report on the operation of a clinic for examination and treatment of the abnormal child. The examination of the child consists of four parts (*a*) social, (*b*) physical, (*c*) psychologic and educational and (*d*) psychiatric. The value in the clinic is that the child is studied from every standpoint, and the treatment consists in trying to correct any defect whether sociologic, physical or psychologic. The child is not simply classified as to mental age and subjected to group treatment.

Three hundred and seventy-five children have been examined since March 1923, a period of thirteen months.

Excellent results have been reported by teachers of these children but no statistical results are reported.

MOORE, Omaha.

CLINICAL TESTIS MEASUREMENTS IN CHILDREN. H. REICH, Jarhb. f. Kinderh. **105**:290, 1924.

From birth to 11 years there was no growth in size of the testes, based on a series of 221 children. The length averaged from 1.5 to 1.7 cm. and the width from 0.8 to 0.9 cm. At from 11 to 12 years a period of growth started and

continued until the normal adult size was reached at about 16 years, 3.5 by 2.0 cm. Therefore so far as testis size is concerned genital infantilism is rarely recognizable until the period of growth, namely, 11 years of age. In congenital syphilis in infants, there were increased testis measurements. In atrophic infants, in Herter's infantilism and in mongolian idiocy there was no testicular infantilism.

INTRAPERITONEAL BLOOD TRANSFUSION. L. F. MEYER, Jahrb. f. Kinderh. **105**:179, 1924.

This method was used on account of its ease and simplicity. It is as efficient as an intravenous transfusion when using amounts from 50 to 75 c.c. Twenty-five transfusions by the intraperitoneal method are reported. In von Jaksch's anemia the improvement in hemoglobin and erythrocyte count after successive transfusions was regular and rapid. The author considers this a valuable aid in treating the dessication of infectious and alimentary toxemias and in the collapse of atrophy. Blood typing was not done in these cases though it is advisable on account of the rapid absorption not only of serum but of corpuscles.

SUTHERLAND, Chicago.

THE RELATION OF HEREDITY TO THE DISEASES OF INFANCY AND CHILDHOOD. CHARLES HERRMAN, Arch. Pediat. **41**:301, 1923.

Pediatrists have unusual opportunity to study tendencies and peculiarities at a very early age. It is important to detect these early in order to prevent their further development. Inheritance of physical and mental traits apparently follows the same laws. Tendencies and peculiarities may be manifested only later when unfavorable environment comes into play. Good health and nutrition do not necessarily go hand in hand with resistance or immunity to diseases. Prenatal care of mother has definite limitations as regards fetal development. We cannot influence germ plasm defects. Only the worst kind of mating can at present be prevented by law, the best can be encouraged.

VON MEYSENBUG, New Orleans.

THE SERUM PROTEIN IN DISEASE. MAXIMILIAN SCHINDERA, Deutsch. Arch. f. klin. Med. **144**:113, 1924.

The author has investigated the total serum protein, albumin and globulin fractions, fibrinogen content of plasma and sedimentation rate of the red blood cells in various diseases (scarlet fever, dysentery, lobar pneumonia, influenza, etc.) and concludes that none of the before mentioned vary from the normal values specifically and consistently in any of the foregoing conditions so as to be of diagnostic significance. However, in six patients with scarlet fever, who varied in age from 9 to 19 years, the findings were constant. 1. Sedimentation rate of red blood cells and fibrinogen content of plasma are both increased in the first few days, rapidly returning to normal on the third or fourth day. 2. The albumin fraction falls and coincidently the globulin fraction rises between the fifth and tenth day of the disease. 3. The total serum protein first falls, then attains normal values with convalescence. No mention is made of the changes in normal figures which occur with age. He also makes the statement that the plasma protein is consistently low in dysentery. The literature is briefly reviewed and the methods employed discussed. As normal figures, he uses sedimentation rate, up to twenty minutes. Fibrinogen, from 0.1 to 0.26 per cent. Serum protein, from 7.0 to 8.5 per cent. Albumin, from 4.2 to 6.8 per cent. Globulin, from 1.3 to 3.5 per cent.

THE BLOOD CALCIUM IN DISEASE. W. H. JANSEN, Deutsch. Arch. f. klin. Med. **144**:14, 1924.

The calcium content of whole blood of normal adults is remarkably constant (from 7.5 to 8.9 mg. per hundred cubic centimeters). Calculated as calcium monoxid it varies between 10.5 and 12.5 mg. per hundred cubic centimeters. The author worked exclusively with whole blood, and calculated his results as calcium monoxid. The method is not given. Where the figures deviated from the before mentioned limits, they were regarded as significant. The results obtained in 120 cases of various disease groups were as follows:

1. Normal figures for blood calcium in the various infections. Lobar pneumonia, however, showed first a reduction followed during lysis by a considerable elevation (up to 15.5 mg.).

2. Normal figures in gout and diabetes except in a complicating ketosis, when a decrease occurred.

3. Marked lowering in parathyroid tetany (from 6.0 to 6.8 mg.). No mention is made of the findings in infantile tetany.

4. Lower limit of normal figures in epilepsy (from 9 to 10 mg.).

5. Reduction in cardiac decompensation, whether due to syphilis, nephritis or essential hypertension (from 9.2 to 9.8 mg.).

6. Reduction in asthenic persons with disturbances of the vegetative nervous system, and in hyperthyroidism (from 8.4 to 9.2 mg.).

He makes mention of the importance of ionizable calcium in controlling nervous and muscular irritability, and the interrelation of the other cations with calcium but does not dilate on it.

LEVINE, New York.

Book Reviews

AFFECTIONS DE L'APPAREIL RESPIRATOIRE (CLINIQUE MEDICALE DES ENFANTS). By P. Nobécourt. Paris, Masson et cie, 348 pp., illustrated, 22 francs.

This volume is largely compiled from a number of articles, written for various journals. The respiratory affections of children are taken up in a somewhat different manner from that which is usual in America.

The first chapters are on the upper respiratory troubles of scarlet fever and measles. The next chapter is on enlargement of the peribronchial glands. Pneumonias of various types are considered, as well as the inflammations of the pleura. The respiratory complications of various infectious diseases are also taken up in detail, and tuberculosis is considered from several standpoints. The book ends with a consideration of asthma both from a clinical and a therapeutic standpoint.

Each chapter is well illustrated by quotation of cases. There are many roentgen-ray pictures in the book to illustrate these cases. On the whole, the monograph should be a valuable addition to the clinical knowledge of respiratory affections in children.

PHYSIOPATHOLOGIE DE L'APPAREIL DIGESTIF DU NOURRISSON. By Enrique Suner, Professor of Pediatric Clinic of Faculty of Madrid. Paris, Masson et cie, 92 pp., illustrated, 10 francs.

This is a small brochure which is quite up-to-date in the handling of the question of nutrition of infants. It begins with chapters on digestion in general, and lays special emphasis on the fact that digestion takes place not only in the gastro-intestinal tract, but also in the cells.

While there is no bibliography attached, the writer shows a familiarity with the literature, which is unquestioned when one reads the text. This is especially true of his familiarity with the American literature, to which on certain subjects he pays great tribute.

The book, on the whole, is a very clear exposition on the subject, not overburdened with scientific facts and is quite readable.

News and Comment

The next meeting of the Central States Pediatric Society will be held in Rochester, Minn., Oct. 30, 1924, and in Minneapolis, Minn., October 31 and November 1.

Dr. E. J. Huenekens, President, will have charge of the Minneapolis meeting and Dr. H. F. Helmholz of the Rochester meeting. Dr. H. T. Price of Pittsburgh, Pa., is secretary.

The next meeting of the American Child Health Association will take place October 14-16, 1924, at Kansas City, Mo.

Society Transactions

AMERICAN PEDIATRIC SOCIETY

Thirty-Sixth Annual Meeting, Held in Pittsfield, Mass., June 5-7, 1924.
Third Session.

DAVID M. COWIE, M.D., *in the Chair*

THE DIAGNOSIS OF DILATATION OF THE BRONCHI IN CHILDREN BY MEANS OF THE INJECTION OF IODINIZED OIL. Presented by DR. P. ARMAND-DELILLE, Paris, France; and DR. C. F. GELSTON (by invitation) San Francisco, Calif.

This paper will be published in an early issue.

DISCUSSION

DR. GRIFFITH: In the hospital of the University of Pennsylvania we have the advantage of the services of Dr. Chevalier Jackson and his assistants, an advantage which we share with Jefferson Medical College. Dr. Jackson, I need not say, is an expert in the use of the bronchoscope, as are those who aid him. In such skilled hands the use of the bronchoscope in the study and treatment of pulmonary abscess is easy, rapid, and very little distressful to the child. The child is bronchoscoped without any anesthetic; and when the procedure is over often jumps down from the table cheerful and happy and as though nothing whatever had taken place. By the use of this method the exact situation of the abscess can be determined; and by weekly bronchoscopic aspirations of the pus it is surprising how remarkably well the children do. The work which Dr. Armand-DeLille and Dr. Gelston has presented is certainly a distinct advance, and the method should become generally useful; for the use of the bronchoscope is, of course, not to be recommended except by those well trained in its employment.

DR. CHARLES HENDEE SMITH: This is a very interesting new light on a very important subject. These children with bronchiectasis are rather frequently seen; we have about twenty at Bellevue under continuous observation. They go along for an indefinite time without getting better or worse, so anything that offers hope is most welcome and worthy of a trial. Many of these patients come with the history that they have been in tuberculosis sanatoriums. Recently I visited two sanatoriums for the purpose of giving clinics and in one institution found three cases of chronic fibrosis and in the other four. In one institution they knew that these were not cases of tuberculosis, but they kept the children there because they were doing well. They all had the picture of fibrosis with moderate bronchiectasis. It seems to me that we should think of these cases as fibrosis primarily, for there are many different degrees, varying from a slight fibrosis to the severe cases with large bronchiectasia. If we speak of the condition as bronchiectasis we are likely to forget the earlier stages and milder cases of fibrosis which are fairly numerous.

DR. HELMHOLZ: I should like to emphasize what has been said about the cases of mild bronchiectasis where there is a lesion at the base, of an indefinite nature, and the roentgen-ray findings are not typical because the condition is in its early stages. It would seem that with this method we might have the means of diagnosing the condition much earlier than heretofore.

Have you had any cases in which there have been any untoward results? It seems to me that this technic is rather difficult for use in the milder forms of bronchiectasis.

DR. HEIMAN: In the milder forms of bronchiectasis where tuberculosis has been eliminated we have found that the inhalation of turpentine and creosote, and thiocol internally beginning with 2 grains and running up to 100 grains daily, watching the kidneys for the appearance of phenol (carbolic acid) in the urine, have been efficacious. Under this treatment, in the milder cases, the children gain weight and do remarkably well. In the circumscribed cases in which cavities are formed later, cases lasting from three to six months, we invoke the aid of surgery. In the diffuse type where there are multiple abscesses and surgery cannot be of any avail, I believe this method would be the rational one.

DR. GELSTON (in closing): We have had no bad results except in one patient, where there was a sharp reaction at the second attempt to inject the oil with symptoms of dyspnea and congestion of the face. This did not progress further, but the injection was discontinued. As further evidence of the slight reaction to the injections, the fact may be cited that the child, after the instrumentation, walked three blocks to the hospital.

There are two points in connection with this work which have interested me especially. The first comprises the investigation of early forms of bronchiectasis and also of the various types of chronic bronchitis, so-called, which occur so frequently in children. The second is the definite possibility of securing an adequate method for application of drugs to the bronchial mucous membrane.

THE USE OF THEOBROMIN SODIOSALICYLATE IN THE TREATMENT OF HYDROCEPHALUS.* Presented by DR. W. MCKIM MARRIOTT.

This paper will be published in full in an early issue.

In the medical treatment of hydrocephalus the object to be attained is an increased absorption or a diminished secretion of cerebrospinal fluid. It has been observed that when the surface tension of the blood is raised, there is a tendency for fluids to pass from intercellular spaces and serous cavities into the blood vessels. One of the most effective means of raising the surface tension of the blood is the administration of theobromin sodiosalicylate (diuretin) by mouth. In a series of patients we have been able definitely to influence the course of hydrocephalus by oral administration of diuretin.

Favorable results are to be expected only in those cases in which there is free communication between the ventricles and the subarachnoid space. The dosage of diuretin for an infant is from 0.1 to 0.3 gm. three or four times a day. The dosage depends on the rate at which the head is increasing. When sufficient diuretin is given to a patient with the communicating type of hydrocephalus, there is usually complete cessation of the growth of the head. When the diuretin is stopped the head again begins to increase in circumference. The treatment has to be continued for a long period, but in some cases, as the child gets older, the amount of diuretin can be diminished or even completely stopped. In one patient, who has been under observation for a year, the head is now increasing only very slowly, even when the diuretin is not administered. We have observed no ill effects from the long continued use of diuretin. Infants under the treatment have gained weight and have developed in a normal manner.

DISCUSSION

DR. BARTLETT: Dr. Alfred Taylor, New York City, has tried puncture of the corpus callosum in thirty or forty cases of hydrocephalus of the communicating type. He has three children whom he considers cured in this group. This is not an encouraging record.

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*From the Department of Pediatrics, Washington University School of Medicine and the St. Louis Children's Hospital.

DR. BLACKFAN: I rather hesitate to discuss Dr. Marriott's observations, particularly as I have had no experience in following this form of therapy. As he has said, successful therapy depends on establishing an equilibrium between the formation and absorption of the cerebrospinal fluid. There have been practically three methods used in the surgical treatment of hydrocephalus and many medicinal agents have been tried. There are several reasons why surgery has been unsuccessful. One reason is that the condition is not recognized sufficiently early in order to permit of successful operative procedures. With a thinned cortex and dilated ventricles it is very hazardous to remove the choroid plexus in sufficient amount to eliminate the excess of fluid. I have thought that if children, particularly those with the communicating type of hydrocephalus, were operated on early enough, before there was great enlargement of the ventricles and thinning of the cortex, the results might be better. I think the surgical point of view is the rational method of attacking this problem. Dr. Marriott mentions that the medicinal agents used heretofore have been successful only in the communicating type. This is the type in which we see spontaneous recovery most frequently. During the period of rapid growth much benefit can be obtained by repeatedly relieving the increased fluid by spinal puncture. I have seen a number of patients with this type of hydrocephalus recover with no other method than draining the subarachnoid space by lumbar puncture.

I think there is an objection to using the circumference of the head as an index to the progress of hydrocephalus. It is necessary for the pressure to become quite considerable before it exerts marked influence on the skull with separation of the sutures; hence I think a better criterion of the progress of the hydrocephalus is obtained by measuring the thickness of the cortex, as this is first compressed to a marked degree before the circumference of the head is altered.

I hope it will be proved that diuretin will result in the improvement of a large percentage of the patients with hydrocephalus. I should like to ask why, if diuretin increases absorption by altering surface tension, it does not have the same effect on the obstructive type as on the communicating type of hydrocephalus?

DR. BLACKADER: I should like to know whether Dr. Marriott can inform me as to the actual amount of urine passed by the hydrocephalic infants while he was giving fairly large doses of theobromin sodiosalicylate for infants. Under ordinary circumstances, we regard theobromin sodiosalicylate as irritating to the stomach and therefore as a disturbing element. Since theobromin is a distinct diuretic, has this diuretic action any influence on the check to the increase of the hydrocephalic fluid?

DR. BARTLETT: We have had some experience with puncture of the corpus callosum. Dr. Sharpe has operated on ten or more patients and we feel that there have been three or four cures in the noncommunicating type of hydrocephalus.

DR. GERSTENBERGER: Dr. Marriott recently was good enough to tell us about his work with diuretin. Since then we have given diuretin to two children, aged 3 and 6 years respectively. The former of these was considered to have a mild form of idiocy, probably the result of a birth injury. This child produced more spinal fluid than is normal as shown by puncture. Since he has been given the diuretin he has become much more docile and seems to be improving generally. The other child, aged 6 years, was thought to have a tumor or to be in an early stage of tuberculous meningitis. Both of these suppositions could not be confirmed. The administration of diuretin resulted in improvement. This has led me to wonder whether in cases other than hydrocephalus, such as migraine, this treatment might not be of value.

DR. HEIMAN: After it has been established that diuretin causes a decrease in the excess of fluid, why not use the two methods, spinal puncture and the administration of diuretin?

DR. MARRIOTT (in closing): I agree with Dr. Blackfan that a large part of the absorption of the cerebrospinal fluid takes place over the surface of the brain. When the spinal fluid cannot pass from the ventricles over the surface of the brain or to the spinal subarachnoid, diuretin has not been found effective. We had one such case. I do not think that much absorption takes place in the ventricles.

DR. BLACKFAN: I believe it does.

DR. MARRIOTT: In regard to the effect of repeated lumbar punctures, this is a method that we have frequently used. Lumbar punctures were done on all of the cases reported, but the effect was only temporary. During the period of diuretin treatment, no lumbar punctures were done, as we did not wish to confuse the effects of the lumbar puncture with those of the medication.

A better measure of the progress of hydrocephalus than the circumference of the head would be an estimate of the thickness of the cortex, or of the total volume of fluid.

In reply to Dr. Blackader, we did not measure the urine of the babies receiving diuretin, but these babies did not become desiccated under the treatment and they all gained weight at a normal rate. I do not believe any excess of fluid was removed from the body tissues. It seems probable from the result of recent work that the effect of theobromin sodiosalicylate is not so much on the kidney itself as on the blood. The effect of diuretin is to change the surface tension of the blood and this causes fluid to pass from the tissues into the blood. The kidney can then excrete the water. In many cases of nephritis the edema is not due to renal retention of water at all, and these are the cases that are most benefited by diuretin.

As to surgical means of treating hydrocephalus, we have seen some of them tried with success, but the mortality is high. Surgical means, however, must be used in the complete obstructive types.

It should be mentioned that none of the patients studied were suffering from meningitis during the period of observation and none had syphilis.

THE EFFECT OF TONSILLECTOMY ON EXISTING VISCERAL DISEASE. Presented by DR. ALFRED HAND.

Although the doctrine of focal infection as a cause of organic visceral disease is not new, its application in recent years is probably of more value because of the roentgen ray and the advances in bacteriology and in operative technic. While the tonsils are not the sole portal in children for rheumatism and endocarditis, they act as such in the great majority of cases; to prevent these conditions tonsillectomy will probably continue its present vogue until some line of treatment, now unknown, will be found applicable to infected tonsils in situ and will restore them to health. An important question is when to remove infected tonsils that are associated with endocarditis; whether to operate during the acute, febrile stage or to wait at least several weeks when the fever has subsided. Conservatism would seem to be the safest policy.

Tonsillectomy is usually done as a hygienic or preventive measure, but a curative action seemed to follow in the cases reported, with disappearance of the murmur and a return to normal cardiac limits in one case and great improvement in the others. Etherization did no harm but in one patient who had great hypertrophy and heaving precordia; the pulse under ether became fuller, stronger and slower than at any previous time.

CASE 1.—A girl, aged 11 years, had had three attacks of rheumatism in the last three years; the apex beat was to the left of nipple line, with a systolic murmur transmitted to the axilla; after one month of normal temperature, the tonsils were removed; then there were two short attacks of rheumatism, without fresh endocarditis apparent; nine months later she was in robust health, with the apex beat in fifth interspace, 1 inch (2.5 cm.) to the right of nipple line and several observers could hear no murmur.

CASE 2.—A girl, aged 7 years, had marked decompensation and anemia; pulse, 138; hemoptysis; apex beat in the sixth interspace, 11 cm. to the left of the midsternal line; double mitral murmur; five months later the tonsils were removed and the pulse rate came down below 100, with gain in weight and growth following immediately; two years later fresh cardiac involvement subsiding in a short time, five months later the apex beat was in the nipple line, with a single systolic murmur and pulse of 96.

CASE 3.—A boy, aged 6 years and 3 months, began to have tonsillitis at 4½ years, three attacks having occurred, each with endocarditis; when first seen he was very pale (hemoglobin, 48 per cent., Dare); respiration, 60; pulse, 120; precordia bulged forward and heaving with each heart beat; the apex beat was in the midaxilla, from 14 to 16 cm. to the left of the midsternal line; presystolic and systolic murmurs; liver greatly enlarged; lower lobe of right lung dull with absent breath sounds; after nine months, there was some improvement, considered sufficient to justify tonsillectomy in order to avoid recurrence of tonsillitis in coming winter or spring; under ether, the pulse fell to 85, full, regular and strong and remained so during convalescence. At present, eighteen months later, the apex beat was 11 cm. to the left of the midsternal line.

DR. KERLEY: My faith in the removal of tonsils and adenoids as a preventive of acute articular rheumatism and endocarditis has been quite shaken. Within the last few months I have had two girls, aged 15 and 16 years, who developed endocarditis although their throats are perfectly clean, the tonsils and adenoids having been properly removed. I have had one case of erythema nodosum in a girl operated on a year ago. During the winter I had three cases of acute rheumatism without heart complications in patients who had had their tonsils and adenoids removed.

The operation had been well done. These were all cases that I would pass on as having been skilfully done. All of the patients had congested throats and cervical adenitis. In two the adenitis was severe.

Three years ago I saw a boy with badly infected tonsils and acute rheumatism with multiple joint infection. In the badly infected tonsils there was a beginning abscess, and the heart presented a well defined systolic blow. I advised immediate operation, though the temperature was 104 F. at the time. Following the operation there was a rapid drop in temperature and the patient made an uninterrupted recovery. About the same time I had another case very similar, in a girl, except that the heart was not involved. The same procedure was advised and was carried out with satisfactory results. A little later I saw another patient, a girl, aged 12, who had a high temperature, marked chorea and very badly infected tonsils, filled with cheesy material and exuding pus. I advised removal of the tonsils having had such favorable experience with the previous two cases. Before the operation the girl did not have a sign of a heart lesion, immediately after she developed a pancarditis and died in five days. I feel that the matter of operation in acute cases of tonsillitis should be looked on in the light of an emergency measure.

DR. HEIMAN: I cannot let this subject pass because I presented a paper on it before this society. First we must meet the indications for tonsillectomy. These are: (1) hypertrophy of the tonsils with obstructive symptoms; (2) changes in the tissues, such as are shown by raggedness, friability and irregularity; (3) diseased tonsils with crypts full of cheesy material or full of pus; (4) constantly enlarged cervical glands that show no tendency to diminish in size. Tonsils which do not function physiologically should be removed; of course we all believe that tonsils are important as barriers in the prevention of disease if they function normally. I fully agree with Dr. Kerley that we see any number of recurrences of sore throat, and inflammation of the cervical glands, in which the patients run a temperature for weeks or longer following tonsillectomy. Then we must also consider that the Luschka tonsils and other lymphoid tissue of the nasopharynx may act as portals for infection.

DR. HAND (in closing): The indications for tonsillectomy form a subject outside of my paper but I would like to add one to those mentioned by Dr. Heiman, that of acute follicular tonsillitis, one attack of which I believe always leaves diseased tonsils. Last winter I saw a number of infants with acute tonsillitis but, although I believe those tonsils remain infected, I would hesitate to have them removed for several years unless they show further disturbances.

I believe the removal of tonsils during an acute infection should be only an emergency measure; if pus is present it should be brought out as in any other location. Chorea is perhaps in a different category from rheumatism; in the former the nervous system is so easily disturbed that an operation may be much more serious.

STUDIES IN THE ROENTGEN-RAY TREATMENT OF WHOOPING COUGH. Presented by DR. HENRY I. BOWDITCH, DR. RALPH D. LEONARD (by invitation) and DR. LAWRENCE W. SMITH (by invitation).

Paper appears on page 322.

DISCUSSION

DR. LEONARD: In this series of whooping cough cases, the roentgen-ray has been used first as an aid in treatment, and secondly as a help in the demonstration of the pathologic conditions of the chest. Just a word first as to some of the technical details of the treatment.

During the first year of our investigation, we used the following technic. Patients were given routinely three treatments, the first treatment covering the whole of the chest and throat from the front, the second treatment over the back and the third treatment over the front again. In many cases in which immediate improvement was not shown, a fourth treatment was frequently given over the back. We used four milliamperes of current, from 5 to 6 inch (from 12 to 15 cm.) back-up spark, one millimeter of aluminum filter, from four to five minutes, the tube distance being twenty-four inches (60 cm.).

This year, in our series of cases, we have varied the technic to a slight extent. The patients still receive three routine treatments, sometimes more if symptoms persist. Instead of covering the entire chest and throat, we have in some instances localized the treatment to areas covering the roots of the lung. Both the front and back are treated at the same visit. We have also diminished the distance from twenty-four inches (60 cm.) 16 or 18 inches (40 to 45 cm.). We have thus increased the total amount of roentgen ray given in these three treatments from perhaps one-third of an erythema dose to nearer two-thirds of an erythema dose. With neither of these technics have we discovered, or is there any reason to expect, any bad effects. The total amount of roentgen ray is well under an erythema dose. There have been no toxic effects, and particularly where the treated areas are confined to the root of the lung, there is no reason to look for effect on the thyroid gland. In fact, it has been our custom in many instances to cover the thyroid gland with lead, but we feel that this is really an unnecessary precaution.

The results with this intensified treatment, I think, on the whole are better than with the previous method. I feel that there is opportunity for further modification of the treatment. For instance, a treatment localized over the larynx in addition to the roots of the lungs may be given.

In regard to the use of the roentgen-ray in radiographing the chest, may I say first that the characteristic finding at the height of the disease is a definite hypertrophy of the glands about the root of the lung; secondly, in many of the cases, we find accompanying this glandular hypertrophy a marked peribronchial thickening involving the larger bronchi and particularly those extending into the right lower lobe. This peribronchial thickening may also involve the bronchi of the left lower lobe, but on account of the heart shadow, we are unable to define clearly the left lower lobe.

There is also a third class of changes which I presume are manifestations of various forms of bronchopneumonia. Many of the cases, perhaps 30 per cent. show evidence of definite infiltration in the right lower lobe. Rarely do we find evidence of definite bronchopneumonia in other portions of the lungs, but this involvement of the right lower lobe seems particularly char-

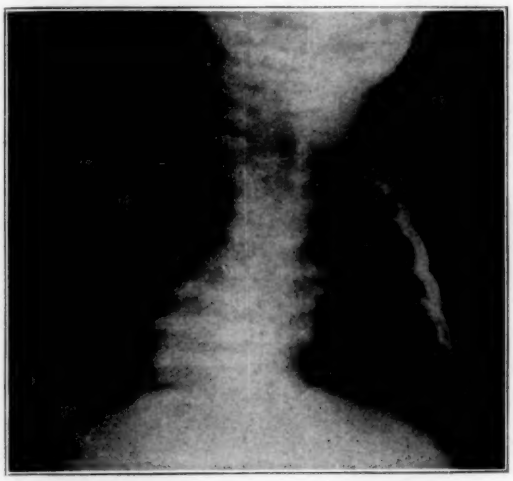

Fig. 1.—Typical glandular hypertrophy, together with the peribronchial thickening of the larger bronchi of the right lower lobe.

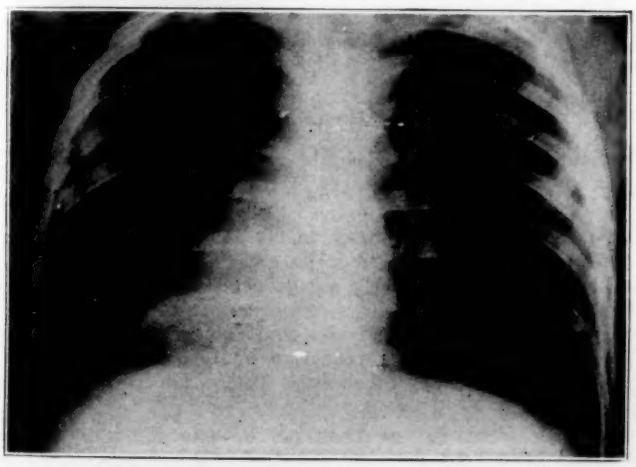

Fig. 2.—Typical pertussis glandular hypertrophy and peribronchial thickening.

acteristic of pertussis. Cases showing this infiltration frequently show no temperature, no prostration, no localized lung signs. So far as the glandular hypertrophy is concerned, I do not know that these glands show any peculiarities differing from the enlargements due to measles or any other acute infection.

I think, perhaps, that we *can* differentiate them, and this is a field in which further study is going to be made, from the glandular hypertrophy due to a tubercular infection. The main differential point between glandular hypertrophy due to pertussis and that due to tuberculosis is a matter of age. The tubercular glands are usually denser, which is due to more or less fibrosis and many of course show calcification.

As yet, we have not been able to follow most of our cases longer than three or four months. We have been unable to demonstrate that enlargement of the glands due to pertussis is permanent, or that they take on a fibrous or calcified appearance. In other words, we have been unable as yet to demonstrate that the enlarged glands due to pertussis later become tubercular.

DR. BOWDITCH: The only remark that I can make further is to say that I want you somehow or other to realize what this can do. If we study the

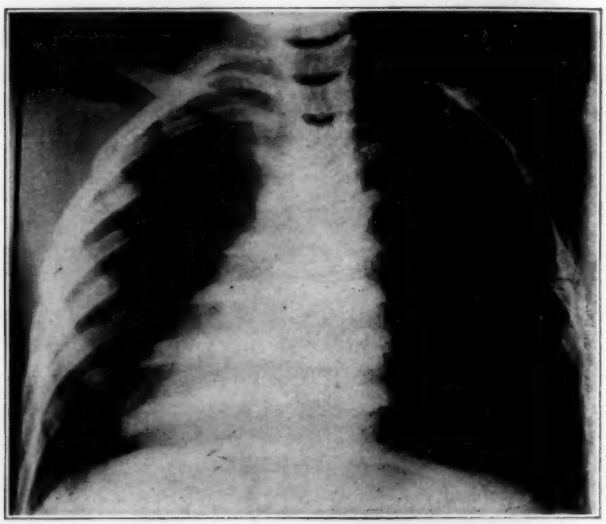

Fig. 3.—Same patient after roentgen-ray treatment, showing absence of the glandular hypertrophy and the peribronchial thickening.

bronchial glands, we have an approach to the study of tuberculosis, and of the relation of whooping cough and measles to tuberculosis. Whooping cough, measles and tuberculosis constitute a group of diseases in which it seems right that we should have connected groups of workers in three or four cities, working on this problem with the same idea and conferring with one another; in that way we might get a greater reduction in the number of cases of tuberculosis than we can get in any other way.

ROENTGEN-RAY EXAMINATION IN DISEASES OF THE KIDNEY.* Presented by DR. RICHARD M. SMITH.

This paper will be published in full in an early issue.

Children between the ages of 5 and 15 years frequently have recurring attacks of abdominal pain, the cause for which it is difficult to determine.

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*From the Department of Pediatrics, Harvard Medical School and the Children's and Infants' Hospitals.

Pyelitis is common in infancy and childhood and the cure is sometimes hard to accomplish. In these two conditions roentgen-ray examinations are of great assistance in determining the presence or absence of a definite pathologic lesion in the kidney.

In recurring attacks of abdominal pain diseases of the gastro-intestinal tract, or enlarged mesenteric glands, or lesions of the kidney must be considered carefully in every instance. Careful physical examinations, blood counts, roentgen-ray examinations of the kidney, a barium meal and enema, cystoscopy, pyelograms, tuberculin reactions, urinary examination and the injection of the urine in a guinea-pig will serve to differentiate between these three conditions.

In diseases of the kidney associated with congenital malformations or chronic infection pyelogram is essential for definite diagnosis.

Plates are presented showing diseased conditions of the kidney, stone, malformations of the ureter, aberrant vessels of the kidney and chronic pyelitis.

DISCUSSION

DR. HELMHOLZ: I think we all feel indebted to Dr. Smith for having presented this very interesting group of cases. We have in pediatric literature many statements as to the frequency of pyelitis and its relative harmlessness. One must distinguish the pyelitis which conforms to the rule that it does clear up with or without treatment and that which is definitely associated with a condition of urinary stasis. The point has been stressed that we have a group of cases in which symptoms do not become apparent until later in life. I am inclined to believe that if these cases were investigated early, a persistent recurring pyelitis would be avoided. A pyelitis which does not clear up with ordinary treatment should be investigated to the fullest extent possible. In that connection, I should like to call attention to cases due to imperfect emptying of the bladder, the so-called cord bladder, associated with deformity of the lumbar spine. In these cases, as a result of the imperfect emptying of the bladder, one may find dilatation of the ureters and pelvis even if there is no other form of obstruction.

There is one other thing that we as pediatricians have neglected in the study of pyelitis, that is, the question of residual urine. In any case that does not yield to treatment, the question of residual urine should be considered.

DR. BLACKFAN: Another group of pathologic conditions not included in this study, and to which attention should be directed, are the chronic forms of pyelitis due to congenital stricture of the urethra, particularly in young boys.

THE NEW-BORN PICTURE IN ACHONDROPLASIA. Presented by DR. FRANK C. NEFF.

As a basis for discussion I wish to present a report of a case of achondroplasia in an infant which came under observation immediately after birth. The child was one of twelve children; of these, three were premature, stillborn and with polydactylism alone. In the patient, the polydactylism is bilateral, the sixth finger being double and projecting at a marked angle from the side of the hand; it has double phalanges, two nails and the soft parts completely fused. There is not the typical grouping of the digits seen in the trident hand; instead of the middle finger being the longest the index and middle finger are of equal length and size. The ring finger is the longest, and has the appearance of a normal middle finger. As the carpal bones of the newborn infant are still cartilaginous, no carpal centers are seen in the roentgenogram of the dwarf. Three centers in the tarsal bone are clearly shown in this roentgenogram. The spinal column in achondroplasia at birth does not show the three sagital curves of the normal infant; the normal lordosis is replaced by dorsolumbar bow-shaped kyphosis. Weeldon attributes this curve to the occurrence of a wedge-shaped vertebra at the point of greatest convexity; our roentgenograms show no abnormalities in the vertebral bodies. Roentgen-

ograms of the skull of the dwarf were taken after the injection of air into the ventricles, both in the first few days of life and at the age of 2 months. At birth no increase was found in the ventricular area, only about 2 c.c. of fluid was withdrawn and an equal amount of air was injected. At the age of 6 weeks, the ventriculogram shows a head relatively large, but with no evidence of hydrocephalus. The sella does not appear in the roentgenogram of the new-born. Dandy has described hydrocephalus as a symptom of achondroplasia in childhood and the cause of the disproportionately large head; he states that the hydrocephalus is arrested after childhood, but the head remains large and in some cases the brain defective. Measurements were taken in this achondroplastic infant at birth and at the end of three months and were compared with average normal measurements. In the normal new-born the trunk is about equal in length to the extremities; in achondroplasia the trunk is markedly longer than the extremities. The measurements for the dwarf give lower values, except for the lower portion of the leg in which the length for the two infants is equal. The blood of this achondroplastic infant, as compared with that of the normal new-born, shows no variation except in low phosphorus. The hemoglobin was high even for a new-born up to 10 days and at 4 weeks was 115 with 17.87 gm. per hundred cubic centimeters. The spinal fluid and urine were normal. In the roentgenogram of the body the stockiness of the long bones is evident; the humerus and femur have large flaring ends without cupping such as is seen in rickets; the outer border of the humerus shadow is abnormally curved. No rarefaction is present and the width of the shaft is in marked contrast with that of the shaft in rickets; the height of the pelvis is short; the clavicle is not markedly affected. The chest shows horizontal upper ribs and marked angularity and box-shaped appearance at the sides.

In addition to the measurements of the head and shoulders in the new-born child, it would be of value to keep records of the total lengths of arms and legs of all babies born in the hospital. A comparison of the manifestations in the new-born achondroplast with those of later months and years is of interest; it concerns the time at which the vital capacity of the chest increases; the extent of the growth of the head, at what time hydrocephalus appears and disappears and its influence on brain function; whether the dorsolumbar kyphosis is due to a vertebral defect at birth such as wedge-shaped vertebrae, or its later development; what relation the frequently associated errors in development, such as polydactylism, have with the disease.

DISCUSSION

Dr. Herrman: First in reference to two points that Dr. Neff mentioned—the liability to death in the new-born and the proportion of the head to the length of the body. In normal infants as Dr. Neff stated, the circumference of the head is about two-thirds the length of the body, but if in achondroplasia the ratio instead of being 66 per cent. is 80 per cent. or more the child is not viable. The explanation is that in the worst cases the spine and trunk are also affected so that the body is relatively shorter in proportion to the head and the circumference of the head is 80 per cent. or more in proportion to the length of the body.

In regard to the etiology, Dr. Neff mentioned Jansen's theory. Hart among others brings forward strong arguments against that theory. I believe that achondroplasia is due to a defect in the germ plasm, and that puts it on an hereditary basis. Aside from the cases published where the condition occurred in a parent and in the offspring, I have seen two families in which cousins were affected. In this connection Robert Hutchinson's report is interesting; he observed twins, one of whom was affected while the other was normal. Unless there were differences in the two ova, it is difficult to understand how any form of infection or toxemia in the mother could have affected one and not the other. The other members of the family may present anomalies which point to some

peculiarity or defect in the germ plasm. As many of the defective embryos never reach maturity but result in abortions, miscarriages and stillbirths, the *living* members of the family may present few anomalies. The changes found in the thyroid gland may be present in normal infants. I think we can rule out the thyroid gland. Beside that, I have had eleven or twelve cases of achondroplasia and I have used thyroid and pituitary extracts with practically no effect whatever, so it is not due to essential disturbances of the endocrines.

In regard to the intelligence in these patients. They may go to school and get along fairly well and apparently have normal intelligence, but they are not all of normal intelligence.

A Case of Hereditary Congenital Absence of the Salivary Glands. Presented by Dr. Walter R. Ramsey.

This paper will be published in an early issue.

DISCUSSION

Dr. Abt: There is little that can be said in addition to that which was contained in Dr. Ramsey's report. The absence of the salivary glands is an anomaly, mostly of anatomic interest. Occasionally, the salivary glands are misplaced and out of their normal position. Sometimes the ducts are stenosed, or they may occupy an abnormal site, and where there is congenital atresia of the ducts, cysts may form. A case is reported of a young patient who had two small openings a little above the sternum, and median to the sternomastoid muscle. Saliva exuded from the fistulas. Injection of a colored fluid into the fistulas caused it to appear at the sublingual caruncle. In this case it was thought that there was a communication between Wharton's duct and a branchial fistula on each side.

Absence of the glands is most often noted in monstrosities, and in severe malformations of the face. Defects in the salivary glands are not of much clinical interest, as they are rarely discovered during life.

Encephalitis as a Sequela of Scarlatina. Presented by Dr. Samuel S. Adams.

This report is that of a girl, aged 8 years, who developed scarlet fever on January 27, followed on March 2, by some disturbance in the vision of the right eye, and convulsions.

The urine was diminished in quantity, and showed the characteristics of acute hemorrhagic nephritis.

The case was regarded as one of encephalitis, showing the following signs:

1. A severe optic neuritis, beginning on the right side, rapidly increasing in severity before it had made any marked changes in the left.

2. The rapid development of the same picture in the left eye seven days later.

3. The involvement of the superior oblique muscle of the left eye with some involvement of the left external rectus.

4. The restoration of normal vision without the appearance of scotomas and without some secondary atrophy.

5. Complete restoration of functions of the extra ocular muscles involved.

Dr. Adams regards this as a case of encephalitis following scarlet fever and not as one of encephalitis lethargica.

DISCUSSION

Dr. Place: I have been interested in hearing Dr. Adams' case; it is certainly very unusual and brings up many questions in diagnosis. It is difficult to

maintain that such toxic damage is due to scarlet fever toxins, particularly in view of the time that elapsed from the onset of the scarlet fever to the manifestations described. All the toxic effects due to the scarlet fever should occur within three or four weeks. It would be just as reasonable to maintain that these results were from coincident causes and that they might have occurred in a nonscarlet fever patient. The only striking damage from scarlet fever has been due to its effect on the cerebellum. The striking feature in scarlet fever and measles is the damage to the cerebellum; in diphtheria, on the other hand, even when the toxemia is enough to cause death, central paralysis is rarely present, while in scarlet fever we get central nervous system damage, which clears up in time or under serum treatment. We had a nurse who died of scarlet fever which had involved the central nervous system. She developed the central nervous system symptoms in the second week; she was making a definite improvement at the time of the onset of the symptoms, which were characterized by stupor, then coma and transient paralysis. The spinal fluid was normal except for an excessive amount. At different times 100 c.c. and 60 c.c. were drawn off. The spinal fluid cultures were negative and the cell counts were normal. She died in the second week and there was no necropsy, but we were inclined to think the central nervous system symptoms were due to secondary infection in the brain. The ventricles were tapped but we obtained nothing in the way of information.

I should like to ask Dr. Adams if he thinks the central nervous system damage might be due to kidney damage and that this might have caused the symptoms.

DR. ADAMS: That was my first conclusion, that it was uremic and that possibly the kidneys caused the trouble. My object in reporting the case is to prevent it being considered one of encephalitis lethargica, because I have listened to a dozen case reports, where at necropsy, pathologists could not find a cause for the symptoms and insisted that cases were not encephalitis; and so I was not going to have it that way in this case.

GAUCHER'S DISEASE WITH EXTENSIVE INVOLVEMENT OF THE BONES AND INVASION OF THE SPINAL CANAL. Presented by DR. JOHN HOWLAND and DR. ARNOLD RICH (by invitation).

The enlarged spleen removed from a child, aged 2½ years, was diagnosed as Gaucher's disease. Pain in the legs began a few months later. The patient died at the age of 12½ years, showing at necropsy typical Gaucher's tissue in the liver, the spleen, femurs, pelvis and lumbar vertebrae invading the vertebral canal and lymphatic tissue throughout the body.

In this case, Gaucher's disease acted as a new growth analogous to the myelomas, springing from the phagocytic cells of the reticuloendothelial tissue and invading different organs simultaneously.

DISCUSSION

DR. KNOX: We have all recognized this is a most unusual case and brings up the question of the origin of Gaucher's disease. It is interesting that Gaucher retained the idea that the condition was a neoplasm originating in the endothelium. In the few cases that have been reported, the idea that the disease is of tumor origin has not found acceptance. General opinion seems to have considered it a process of degeneration or infiltration. Some years ago Doctors Wahl and Schmeisser and I reported two cases in sisters—infants, where many of the normal cells throughout the body were transformed into cells very similar to those described by Gaucher. We found in our cases that many of the cells had undergone a kind of lipoid degeneration. Mandelbaum calls attention to the fact that in true Gaucher's disease lipoid degeneration does not take place, but that the protoplasm of the characteristic cells presents a

fine network of fine fibrils, the main strands of which are parallel to the long axis of the cell. All writers have not accepted his dictum. We felt confident that our cases were identical with the one described by Niemann, and the only one in the series in infants except ours. It is interesting that in one of our cases the eyegrounds showed cherry red spots, such as are seen in amaurotic family idiocy. In the latter condition similar cells to those described in Gaucher's disease have been present, and it suggests the possibility that the subsequent degeneration in both conditions may be of similar character. Our cases were in Jewish children.

DR. HERRMAN: Some years ago I had two cases somewhat similar to this one; these two cases were in one family, a brother and a sister. In both children the spleen was removed. In the girl there were changes in the femur seen in the roentgen-ray plate. After the spleen was removed the changes in the bone improved. We thought at first that the condition was a tuberculous coxitis and later we considered it Perthes' disease. After removal of the spleen the bone changes cleared up, so that although the spleen is only one of the organs affected, its removal might improve other parts of the body affected. The boy had no bone symptoms when the spleen was removed but afterward bone changes developed and he was treated for an osteomyelitis of the femur. These cases are interesting as both of them showed bone changes similar to those which Dr. Howland has described.

DR. HOWLAND: There is no doubt that many unreported instances of this disease occur. Pick of Berlin has reported in a few words a case of Gaucher's disease, with involvement of the bones. So far as can be made out from his description, the nervous system was not involved and there was no evidence produced to show that the growths invaded and spread beyond other tissues than those primarily involved, i. e., acted like a tumor.

A CASE OF SCURVY IN A CHILD OF SIX AND ONE-THIRD YEARS FROM AN EXTRAORDINARY DIETARY REGIMEN. Presented by DR. MILTON MILLER.

This case is reported because scurvy is rarely recorded beyond the age of infancy, as well as because of the remarkable diet associated with it. Medical aid was sought because of the child's inability to walk and tenderness in the legs, the condition having been noted for two or three weeks. There was a history of a similar disability six months previously. The symptoms were typical of scurvy. The child consumed three and a half pints of commercially pasteurized grade B milk daily, by bottle, never by glass; in addition she ate ice cream once, often twice daily, crackers, cake, muffins, hot cakes with syrup and candy, and on rare occasions a meat broth or soup, made without vegetables, which she disliked. A proper dietary soon corrected the condition. Through the weakness and indulgence of her parents the child had been permitted to follow her own inclinations in regard to food. That the symptoms were so late in developing, may possibly be attributed to the fact that in the brief periods when the child would partake of small quantities of rational food, she stored up sufficient vitamins to prevent outstanding symptoms of scurvy, although latent symptoms may have been present.

DISCUSSION

DR. A. G. MITCHELL: I am not familiar enough with the literature to know whether this case is unique but cases of this kind certainly are infrequent. They must be of rather common occurrence under war or post-war conditions where foods containing vitamin were lacking. Under such conditions the lack of vitamins would be involuntary and not voluntary as in this case. It is rather strange that this child had a lack of desire for vitamin-containing foods. One would gain the impression from nutritional studies that an animal deprived of

vitamin would crave it. One way to have made this child take vitamin-containing foods would have been to remove other foods from the diet. The milk could have been removed entirely and fruit juices given almost exclusively for a short time. No child will refuse food to the point of actual starvation. After the proper vitamin-containing foods were taken a balanced diet could have been instituted.

DR. ALFRED F. HESS: In some cases three pints of pasteurized milk are not enough to protect against scurvy, for pasteurized milk is by no means an entity. The amount of vitamins in the milk depends on the amount of vitamins in the fodder of the cows. In this case a diagnosis of poliomyelitis was made. We ought to bear that in mind. In the last epidemic of poliomyelitis I met with two cases of poliomyelitis diagnosed as scurvy.

DR. SOUTHWORTH: During the war I had an opportunity of seeing an epidemic of scurvy in one of the city institutions. There were six or eight cases, which were traced to a poor quality of food and a lessened amount of green vegetables. The condition cleared up as soon as the dietary of the institution was improved. The patients were of different ages. I do not recall whether there were any quite so young as this child, but we should not lose sight of the fact that scurvy may appear at any age when the diet fails to convey the requisite amount of vitamin material.

DR. MILLER (in closing): The particular point of interest in this case is that the parents would permit the child to live on such a diet. It shows that one of the functions of the pediatrician is to educate the parents as well as the child.

REPORT OF A CASE OF HEMOLYTIC JAUNDICE. Presented by DR. FREDERICK BARTLETT and DR. MARTHA WOLLSTEIN (by invitation).

Paper appears on page 301.

DISCUSSION

DR. GRIFFITH: A little girl from a Western State was sent to me with the history of more or less jaundice since birth. Calomel and a limited fat-free diet had been prescribed, on the ground that there probably was some catarrhal process present. The child was moderately jaundiced, emaciated and weak. A study of the blood showed that the case was one of hemolytic icterus with increased fragility of the red blood cells; and that therefore nothing was to be gained by a limited or restricted diet, and the family physician advised merely to watch her for the present and to delay any operative interference. Some months later the report came to me that her general health had improved remarkably and that she was in splendid condition. All I wish to say in the way of comment consists of two things: (1) It is not safe in any of these cases to make a positive diagnosis without the employment of the fragility test; (2) I am in accord with the advice given in one of our medical journals, to the effect that any child who is getting along fairly well, with pretty good general health and only moderate jaundice, had better be left alone, so far as splenectomy is concerned. This conclusion is not, of course, applicable to Dr. Bartlett's case, which was one of much greater severity.

DR. NEFF: There have been enough splenectomies in hemolytic jaundice to prove that it is of wonderful curative benefit. It is a tragedy when a child with familial jaundice does not have this advantage. In a family of three children of which I have knowledge, all three died of hemolytic jaundice within a period of two years. The mother and one of the children showed the following fragility tests: In the child hemolysis began at 0.475, was complete at 0.395; in the mother it began at 0.450 and was complete at 0.397. Splenectomy was not permitted in any of the three cases.

AMERICAN PEDIATRIC SOCIETY

Fourth Session

GRAPHIC METHODS OF RECORDING PHYSICAL SIGNS. Presented by DR. CHARLES HENDEE SMITH.

Written descriptions of physical signs are often incomplete, inaccurate and time consuming. Graphic methods help us to transfer to the record the exact localization of any abnormal signs present, and by the use of a simple code the character of the signs may easily be indicated. Such a code has been in use at Bellevue Hospital for about seven years. It saves much time and makes both interns and visiting staff more careful in making and recording examinations. By means of a rubber stamp, chest outlines are printed in advance on continuation sheets. The signs are always described in writing as well as graphically. Care must be taken exactly to outline the area over which the signs are present. Signs in the heart may also be recorded graphically. The position of the apex and the borders show its size. The time and duration of a murmur may be shown on a simple diagram. The total area over which the murmur is audible, its maximum site and transmission are also marked on a chest diagram. This method has proved of much value in obtaining accurate records. The photograph not only serves as the best means of transferring to the record the aspect of the patient, but also may be used as the basis for the graphic method of recording lung and heart signs. By means of water color paint these may be marked on the patient's skin and then photographed. This kind of diagram on photographs made over a period of years constitutes an invaluable record of the progress of a patient. It is important to have camera, lights and background always ready so that photographs may be taken without delay by a member of the medical staff. Colored lantern slides make it possible to show rare cases to many students.

DISCUSSION

DR. MORSE: I must say that I cannot see any advantage in these graphic signs over the old methods. It seems to me that the kind of records kept in a hospital depends entirely on the attitude of the visiting staff. If they are determined to have good records, they get them. Otherwise, they do not. If interns will not keep proper records, they should be replaced by others who will. I do not see how an intern can be expected to put these signs down any more accurately than he writes. It seems to me that he is much more likely to write so that he can be understood than he is to make all these snakes and worms properly and to have them running in the right directions. One of the values of records is for the distant future. The English language has not changed much in the last one hundred years and the records written now will be understood one hundred years hence, while these records that Dr. Smith has presented will not be understood unless each one is accompanied by a key.

There is one great objection to all records that have headings and places to be filled in, namely, that they tend to stifle initiative. A man gets into the habit of filling in under the headings and leaves out whatever does not fall under these headings. What is left out is often the most important.

No one can disagree as to the value of photographs, they show for reference what cannot be shown in any other way.

DR. CHARLES HENDEE SMITH: I am glad Dr. Morse was here for that is the kind of discussion one wants. The man who gets up and says "This was an interesting paper and I am glad to have heard it" helps no one. How-

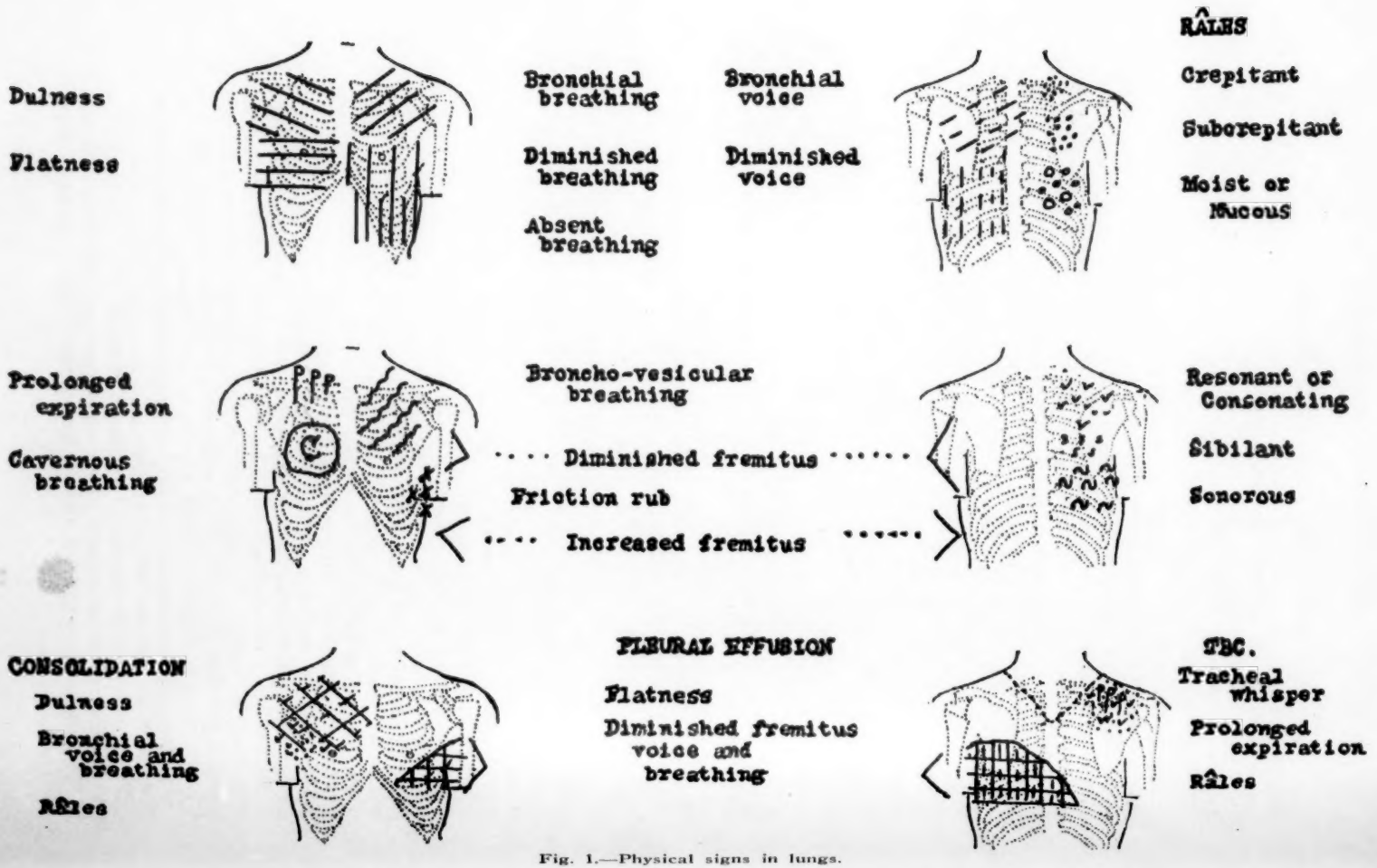

Fig. 1.—Physical signs in lungs.

Fig. 1.—Physical signs in lungs.

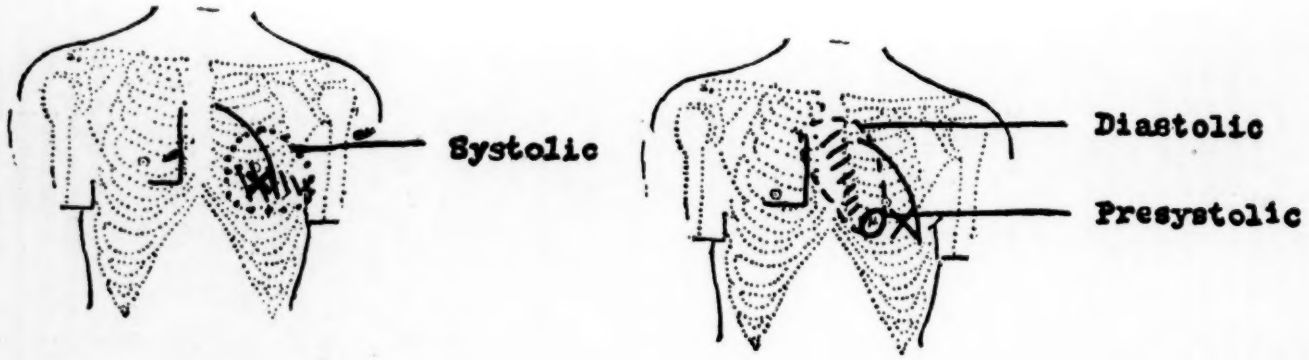

Fig. 2.—Physical signs in heart. Solid outline equals cardiac borders; cross, apex; dotted line, systolic murmur; dashes, diastolic murmur; solid line, presystolic murmur; shaded area, maximum site of murmurs.

ever, my experience with the "inferior" (?) grade of medical men in New York is that if they have to outline the total area over which a murmur is heard, they will know a great deal more about a murmur than if they simply say it is a "mitral murmur" and call it a day's work. I mention in my paper that a written description of the physical signs is not replaced by the graphic method. They must always be written out in full on the original record and on the continuation record. But with signs in the lung or heart over an irregular area, I defy anyone to describe their exact distribution as easily and as accurately in writing as can be done by a diagram.

This is no new plan. We have used it for seven years. I offer it as a simple and accurate method, as one which leads to greater care in examination, and as one which works.

MORBIDITY AND MORTALITY IN THE NEGRO INFANT. Presented by DR. J. H. M. KNOX.

The high mortality and morbidity rates among the negro present a public health problem of peculiar difficulty. This race, one-tenth of the whole population, at first our property, has become in reality our ward. The white race must assume a large measure of responsibility for the physical condition of the negro.

Throughout the south the negro lives in immediate contact with the white race, and its morbidity rate is a menace. Although some have asserted that a tropical race cannot survive in a cold climate more than ten or fifteen generations, we are faced with the fact that the negro is increasing more rapidly than the white in this country.

The outstanding causes of infant mortality in the negro are prematurity, tuberculosis, syphilis and secondary pneumonia. In the registration area, syphilis and tuberculosis are each four times more frequent in the negro than in the white infant, and pneumonia occurs 2.3 times more.

A larger proportion of negro children die in their first weeks of life than white children. In Maryland, for example, the neonatal mortality rate is 60 per 1,000 living births. In Maryland, rickets is widespread among the negroes even in the rural districts. More than 70 per cent. of the negro children living in the country under 2 years of age have signs of rickets.

It is interesting to inquire whether this high morbidity and mortality rate is due to inherent racial inferiority. Tuberculosis is practically unknown among the negroes in Africa, and it was a rare disease among the slaves in this country.

The death rate of the negro infant has been reduced in a number of cities more effectively than that of the white infant by similar means. In Baltimore the mortality among Polish babies living in conditions similar to those of the negro is even a little higher than that of the colored infant. The colored death rate is increased by the large number of illegitimate births.

We can conclude that the greatly diminished life expectancy of the negro infant is due to a lower average of moral, economic and educational standards, resulting in unhygienic living. It would seem, therefore, to be the duty of those who recoginze the situation to do even more to lessen the preventable disease and death among negro children in this country.

DISCUSSION

DR. DEBUYS: This paper of Dr. Knox covers the location in which the investigations were made. It is unfortunate that we have no laws throughout the United States requiring the registration of births and deaths in every state. It is difficult therefore, to make comparisons in all sections of the United States. There are, however, some states in all parts of the country included in the registration area. Recently I had occasion to look into the statistics of the two races in regard to morbidity and mortality. The available statistics included

only information gathered from hospitals, dispensaries, and health departments, so that it is not fair to accept these figures as those for the population as a whole.

There are several reasons why reliable information with reference to the colored morbidity is difficult to obtain. They are (1) the ignorance of the colored race; (2) the tendency for negroes to treat their own which is usually the most unsatisfactory manner; (3) the noncooperative spirit that is characteristic of the negro, and (4) because of the tremendous amount of illegitimacy existing in the colored race there is always a greater tendency to conceal information.

In New Orleans the general run of cases with regard to morbidity is about the same in both races. The morbidity in the colored race, however, may be a little more marked in the case of syphilis and rickets and in some of the nutritional and respiratory diseases.

In studying the mortality some interesting information is obtained. The statistics which I could secure from available sources show that the general mortality in the colored race is from one and one-half to two times that of the white per thousand population. It is interesting to know the greatest mortality in the colored population occurs in the Plateau States with the New England states a close second. The figures being 2,393 per thousand in the former and 2,346 per thousand in the latter states. The mortality is at its minimum in the South Central States, which include Louisiana, Mississippi and the adjoining states.

Information with regard to tuberculosis, typhoid fever and malaria shows that the rates for these diseases are higher among the colored than among the white, while diphtheria has a mortality greater among the white than the colored. Strange as it might seem, the death rate from tuberculosis in the colored is greatest in the Plateau States, being six times that of the white, with the New England, North Central and Pacific States showing a ratio of the colored deaths four times greater than the white. The deaths from tuberculosis in the colored is at its minimum in the South Atlantic States. The mortalities from typhoid fever and malaria in the colored are greatest in the South Central States. The mortality from puerperal sepsis is greater among the colored than among the white in all sections of the country, with the exception of the Plateau States. Deaths from other puerperal causes are also greater in the colored than in the white. These latter facts are interesting, for by these deaths infants are deprived of the possibility of nursing and therefore furnish a fertile field for the diseases to which these infants are especially susceptible. It would seem therefore from the foregoing statistics that the health of the colored race is not a Southern problem, nor a sectional one but a national one in this country.

DR. ROYSTER: I have no statistics to quote, and statistics on this subject, as Dr. DeBuys has pointed out, are difficult to secure for reasons that it is not worth while to go into at this moment. But impressions may be of a great deal of value even though they are not backed by reliable statistical data. I have spent twenty-five years in private and public work. I suppose I have given as many hours to the negro as to the white and probably more. I have looked at the problem offered by the colored population from the standpoint of medicine, sociologic and educational. A great deal of this problem is sociologic, and perhaps I am further from a solution than when I first started.

For a race only a short time removed from savagery, and for it to do its own bidding for a still shorter time, the negro race has made a remarkable amount of progress. The greatest progress has been made by those who are not of pure black blood. We are dealing with a very big public health problem. First, last and always there are many conditions we must consider from the standpoints of humanity, economics and sociology, and the last for selfish reasons if for no other. The negro is our servant, the only servant we have at our command in the South. The negro tends to our meals, waits on us at the table and takes care of our babies. You may say that theoretically we

should not have a negro nurse-maid, but what is the mother with five children to do when she is so tired by night that she is scarcely able to care for them? The negro as a race has a shiftless nature, it is true; he moves into a house; cannot pay the rent, which is often exorbitant for the accommodations he receives; moves out and changes his name. This is all unfortunate, but do not misunderstand me; I am the friend of the negro and I do not speak disparagingly of him; I am simply stating the truth. Of course under such conditions dependable statistics cannot be collected. There are a large number of negroes who are elevating themselves economically and culturally.

I have done some 600 intubations, but I have done only one in a negro. I have not had more than twenty cases of diphtheria in the negro; personally, I think only two cases of measles and two of scarlet fever. That is my personal experience over a number of years.

This problem of the negro must be solved by a community of interests; the health departments and the federal government must do their share. I do not know the rural problem, but I do know the problem as it exists in the city. There is only one way to approach it and that is through public welfare clinics, and through the visiting nurses' association, which sends nurses into the home to teach mothers what is best for their children. That is the only way to reach the problem.

I do not want to prolong the discussion, but I just want to picture for you the infant mortality and the maternal mortality from puerperal causes. As you have been told a large number of the children born are illegitimate. Picture a girl turned out of her home at the age of eighteen by her mother because she is about to become a mother. Her mother did the same thing, but with time she claims to have a better moral standard. The girl turned out creeps to the home of a neighbor, and crawls off into a dark corner to have her baby, and before a week she is turned out and leaves the house and leaves her baby to a foster mother. There is one fortunate thing and that is that there is nobody on earth kinder to a baby than a negro mammy. These girls are confined by midwives, as ignorant as any in darkest Africa. They care for the girls for a week or two for $5.00, and many times the midwife has no place to lay her head, except when attending a confinement. This is a condition we cannot control in a day, nor in a generation. Every physician engaged in public health work must do his part for the benefit of humanity and for the sake of himself.

DR. HERRMAN: In New York City we have a good opportunity to pass on this problem. We have infant welfare stations in all parts of the city and no particular district is deprived of these welfare stations, yet the infant mortality among the colored population has always been twice as high as among the white, and it remains so to this day. The infant mortality rates of both races have been reduced remarkably, but that of the negro remains twice as high as that of the white population. When we investigate the cause, we find that the disease least affected by infant welfare work, namely, those of the respiratory tract, are the ones in which the mortality is the highest. For instance, measles, whooping-cough and influenza and, to a certain extent, rachitis are more likely to be followed by death from pneumonia. When a negro infant contracts a respiratory disease it runs a more severe course and the mortality is high. Although the educational side and the social side are important there is also a racial difference.

DR. KNOX (in closing): I do not believe we can solve the infant mortality problem in America until we consider more unitedly than we have ever done before the part the negro infant plays in it.

THE EVALUATION OF A HEALTH CLINIC. Presented by DR. MAYNARD LADD.

The paper emphasizes the importance of medical supervision of Health Clinics, and the results to be obtained by adequate provision for treatment. It is an analysis of seven years experience in medical supervision of children

living in foster homes, in and near Boston, under the care of the Boston Children's Aid Association and The Church Home Society.

Reference to the mortality statistics as given in the charts bring out the following salient facts.

The average for the whole seven years was 8.7 per thousand.

If the deaths due to conditions present and active when the children were accepted for care are excluded, the death rate is exactly cut in half (4.3 per thousand).

As the highest death rate occurs in the first two years of life, it is necessary to study the mortality figures in reference to age. In this we find that the death rate in the first year was 4.9 per cent. or 49 per 1,000. If the death from conditions present and active at time of acceptance are excluded this figure drops to the very low mortality of 2 per cent. or 20 per 1,000. The question naturally arises as to how young the babies were in this group. There were very few babies received under 2 weeks of age; but 21.5 per cent. of this group were one month or under; 13 per cent., two months; 14.5 per cent. three months, and the average for the whole group of 383 infants was 4 months.

In the second year the mortality from all causes was 4.9 per cent. or 49 per 1,000; or excluding deaths from causes present and active at time of acceptance 3.2 per cent. or 32 per 1,000.

It is interesting to note that even with twice the number of infants in the first year as compared with the second year the death rate was exactly the same. This, as will be seen in the summary of the causes of death, is probably due to the very great reduction in deaths from malnutrition and gastro-enteric disturbances, which usually play the most important part in infant mortality in the first year.

Deaths from 2 to 5 years were 9 per 1,000 and after 6 years 3.9 per 1,000.

Lobar or bronchial pneumonia was the immediate cause of thirteen out of thirty-five deaths. No marked reduction in the mortality rate beyond what has been accomplished can be effected in such a group until we have developed means of controlling pulmonary infections, especially those following measles and pertussis. Malnutrition was a possible factor in one case of lobar pneumonia, and in four cases of bronchopneumonia, that is, in only five of the thirteen deaths from pneumonia.

Malnutrition as a primary cause of death was limited to three cases associated with severe gastro-enteric disturbances, all of which were present at the time of acceptance.

Malnutrition was a contributive factor in one case of meningitis, one case of septicemia and in one case of status lymphaticus.

Malnutrition therefore as a primary cause of death was limited to three cases (including the two severe cases of diarrhea) and a contributing cause in seven deaths from acute infections and one from status lymphaticus. In 7 years there were no deaths from infectious diarrhea, diphtheria or scarlet fever.

In conclusion one may reasonably claim that an infant mortality can be greatly reduced by intensive medical supervision. Such an organization as the Preventive Clinic of the Boston Dispensary is practical and of economic value in the supervision of the health of children, under the control of social agencies in large centers in which hospital facilities exist for the necessary cooperation.

Deaths from malnutrition and gastro-enteric disturbances in patients not already moribund or dehydrated at the time of acceptance can be reduced to a very small percentage mortality by intelligent feeding. Pneumonia represents the greatest menace to life, and in its control lies the greatest hope for still greater reduction in the death rate.

DISCUSSION

DR. CARPENTER: We all appreciate that Dr. Ladd has established the model health clinic. We, in Philadelphia, have attempted to copy it. Dr. Ladd's figures prove conclusively what effective results can be obtained in preven-

tive medicine. I do not agree with Dr. Ladd's statement that a health clinic should do both preventive and curative work. There is great advantage in having a preventive clinic located in a hospital in close association with the various curative clinics. With a health clinic in a hospital, one naturally refers all conditions requiring remedial care to the curative clinics, and without any additional cost to the patient. At the first visit of a child to a health clinic, a certain number of defects are discovered, for the correction of which the patient is referred to the proper curative clinic and when corrected is again referred back to the health clinic where the child is kept under supervision as long as it keeps well. I believe that children receive the best medical care when the curative and preventive work are kept distinct. Dr. Ladd's statistics will be of great value to those of us who are conducting health clinics, as we have great difficulty in evaluating our work. It is obviously a difficult matter to determine accurately how much disease we are successful in preventing. The important point is that superior medical work is essential in preventive medicine if we desire to secure results which can be compared with those obtained by Dr. Ladd.

Dr. Royster: I know something of Dr. Ladd's work, and I wish to say that it is a wonderful work. I do not believe it is necessary in most places to separate the preventive clinic from the curative clinic. I think they can both be carried on at the same place successfully. In the clinic conducted at Norfolk with which I was associated for a number of years we have not had one single case of infectious diarrhea in three years; the only cases we have had were those that came there entirely new. We have had 11,000 visits a year paid the clinic in a town of 120,000 inhabitants, and both the clinic work and the outpatient work has been greatly improved. As was hinted in a previous presentation, I feel that the conception of pediatrics is undergoing a change. Pediatrics has been defined as the diagnosis and cure of disease in the young. I do not feel that this definition properly defines pediatrics; I see no way out but to define it as making the best possible citizens of the future out of the material as it presents itself during childhood. Until the doctor gains a social sense, and learns sociologic pediatrics, that definition will not be applicable, and we will not reach that stage until the outpatient clinic, the follow-up work and the medical work go forward hand in hand.

Dr. Knox: I congratulate Dr. Ladd. Results of this kind are the results we would like to have in each community as a whole. We see here 2,000 children brought under adequate medical supervision. This supervision can be made applicable to a community when public sentiment demands it. We all know that it would save a great deal of money and prevent much disease and death. Many of the children who have a nervous breakdown do so because of unnecessary and remediable unfavorable environment in their homes. This is greatly lessened under medical supervision. I believe that even those who are devoting themselves to curative medicine should give a portion of their time to this particular line of work.

A Plan of Home Hospitals for Sick Infants. Presented by Dr. Henry Dwight Chapin.

Certain types of illness rarely thrive under ordinary hospital care. The question is bound up with problems involved in the constant change by rotation of interns and nurses, as well as the ever present danger of all kinds of cross infections. A peculiar aptitude is required for the successful nursing of delicate and sick infants. Many nurses, in spite of training, never acquire this; if a nurse once acquires this facility she should be kept on the job for the good of the baby. Some years ago I tried the plan of sending out babies that were not doing well to some of the boarding homes in my Speedwell Units. As the results were no better than those of the hospital treatment the practice was discontinued. More recently the plan has been worked out somewhat differ-

ently by selecting a number of good homes with especially efficient foster mothers, who under special instruction could adapt themselves to such a work and thus form home hospitals. I now believe there is a promising future for this plan in dealing with many cases of sickness in babies that would otherwise be consigned to the hospital. The principal factor in the success of this plan consists in securing an intelligent and willing foster mother who will carry out orders, always remembering that a moderately trained foster mother will often do better with a sick baby than an overtrained nurse or nun. It is more difficult to establish the home hospital in the congested tenements of New York, but, still, a successful start has been made. Six very sick babies have been thus treated with but one death; this in an atrophic baby with status lymphaticus. These cases all required active service on the part of the doctor, the visiting nurse and the foster mother. Lumbar punctures were done, ear drums incised, gavage feeding and bowel irrigations carried out, temperature records were kept and other procedures were successfully performed as in the hospital. The patients were all rickety, malnourished babies of the type which rarely last long with ordinary hospital care. Hospitals handling sick infants might select a number of promising homes in the immediate vicinity where they could supervise treatment of these patients, or quickly transfer them from the wards when convalescent. The machinery of the hospitals could thus be utilized by sending doctors and nurses into the surrounding homes; this would also have a beneficial effect on the neighborhood. Community health centers might also utilize their medical and nursing staffs in the home hospital care of certain kinds of patients. This plan has the additional advantage of being comparatively inexpensive in reference to the results obtained, and is one that can be operated anywhere and everywhere without any outlay of capital; it stresses human service aside from bricks and mortar.

DISCUSSION

DR. CARPENTER: Dr. Chapin is to be congratulated on the good work done by his Speedwell Society. It does seem, however, to have a very limited application. The chief criticism of the plan is that it separates the mother from her baby. I believe many babies are admitted to hospital wards inadvisedly, who could be treated with better end-results in a properly conducted outpatient department and not taken away from their mothers. I emphasize the words "properly conducted," as too many dispensaries are doing superficial medical work. The assistant physicians working in dispensaries should be remunerated, and a limit set on the number of patients a physician should be expected to treat in a dispensary hour. The appointment system should be more generally adopted. The dispensary physician's time should be conserved by the employment of clerks to take his dictation. Each dispensary should have in attendance graduate nurses who have also received training in schools for social work; these nurses to do the follow-up work, both remedial and preventive. The best results can be obtained with the kind of infants Dr. Chapin has described when treated in the before mentioned kind of outpatient clinic, and also at a lower cost per capita. The great advantage is the permanency of the results obtained. The child does not return to the same environment which brought about his poor health, as the mother has been trained by the physician and field worker and has become better equipped to care for her child properly.

DR. CHARLES HENDEE SMITH: Dr. Carpenter is perfectly right as to the dispensary problem, but Dr. Chapin has given us a bridge to get over the present difficulty while dispensaries are being brought up to the ideal situation. Dr. Chapin's paper was extremely interesting; I think he has described a very valuable experiment, which may be a useful means of filling up the gap in the present methods of caring for acutely ill children.

DR. KERLEY: I have had the opportunity of seeing a great deal of Dr. Chapin's work and have been associated somewhat in following up the results. The Speedwell Society is doing a tremendous amount of good in a certain field.

It fills in a very useful niche. Difficult feeding patients, whose home surroundings are not up to the standard, do better in carefully selected homes.

My results in feeding athreptic infants in the hospital have not been brilliant.

DR. CHAPIN: I do not think Dr. Carpenter got the point of the paper. I was speaking of malnourished babies who are driven into hospitals, and every one of them will die if kept in the hospital long enough; but in a home hospital, under the supervision of a nurse and with a doctor on the job, the lives of many of these babies may be saved. I certainly believe in improving the dispensaries, and I am in favor of the dispensary if the home is a proper one. I would never think of taking a baby out of its home, but there are hundreds of babies drifting into the hospitals and growing thinner and thinner. When I see this I feel that I am making a very poor return for what the babies have done for me; they have made my reputation and I am making a very poor return when I allow them to die in hospitals. In its pneumonia cases in children the Henry Street Settlement gets better results than any hospital in the city, and that is because the patients are not getting heterogeneous infections. When these children are in the hospital, unless you send them out the minute they are better, they get another infection and the temperature goes up again. For that type of case we need something other than the hospital and I am going to keep on trying.

HUMAN MILK: ITS COMMERCIAL PRODUCTION AND DISTRIBUTION. Presented by DR. B. RAYMOND HOOBLER.

The commercial production of human milk has passed through many vicissitudes, but each year it becomes more firmly established and in time will become a recognized occupation for many mothers. The output from the bureau of wetnurses in Detroit during the last eight years has been 414,242 ounces of human milk, approximately 13,808 quarts. In 1916, the milk was produced at a cost of 21 cents per ounce, while in 1923 it cost only 15 cents per ounce. Our present overhead expense could care for handling 100,000 ounces yearly, which would bring the cost of production to 10 cents per ounce. This cost of production includes the amount paid to the mother, which is a flat rate of 10 cents per ounce plus the cost of carfare. The cost of operation comes largely from private patients and from institutions; the total revenue for the year 1923 was $9,388.36. The bureau occupied quarters in the Woman's Hospital, so nothing is included for rent and refrigeration. Of the milk produced, 18,318 ounces were sold to private patients at 39 cents per ounce; it was sold in other quantities at 25, 20, 15, 10 and 8 cents per ounce, while 6,654 ounces were given to patients too poor to pay. The high price was only asked of persons where it involved no hardship. The bureau has a large clientele; some mothers have raised as many as three consecutive babies on the milk furnished by the bureau. The bureau keeps a sufficient number of producing mothers on its payroll to supply more than enough to cover its needs for private cases. This excess each twenty-four hours is distributed free of charge to hospitals caring for sick and premature infants. The largest proportion of producers comes to us in answer to advertisements in the daily press. The requirements demanded of producers are that they must be healthy, Wassermann negative and free from tuberculosis; they must have clean personal habits, live in a clean house and nurse their own healthy babies up to eight months. The mothers must express their milk at least twice daily, must keep the milk on ice until it is delivered and must supply at least 16 ounces daily. The bureau does not stipulate what diet the producing mother should use, but recommends one with a narrow protein ratio. Any article of diet causing an odor to the milk is strictly prohibited. We believe that there are many mothers who are actual milk producers, and that there will grow up in each community an ideal occupation for such as are willing to devote themselves to this lucrative employment. Every community supporting a maternity hospital is a potential center for such a producing group.

DR. TALBOT: I think this work of Dr. Hoobler's is very interesting indeed. It is a very important type of work, ought to be in every city in the country. It is not necessary to speak of the value of the product or of its advantages. In Boston there have been times when the wetnurses were not able to meet the demand and a few times when the demand was not as great as the supply. There are two distinct features in relation to the production of human milk. One of these refers to the well-to-do. We have a wetnurses' directory, which has complete control of the wetnurses. They sell their milk at 25 cents per ounce. The directory supplies wetnurses at $20 per week, $7 of which goes to the nurse and the remainder goes toward paying the expenses of the institution. This comes quite close to meeting the expenses of the directory. It did not seem right to make such an important thing as this an entirely mercantile proposition, so the directors of the wetnurses' directory have given away large amounts of breast milk. They have an arrangement whereby they supply the Children's Hospital with 30 ounces a day and they hope to increase to 60 ounces. Last year 12,000 ounces was supplied to charity without charge, while the total production was about 30,000 ounces. The supply has by no means been completely tapped, as it comes entirely from those living at the directory. A new method of obtaining milk has been introduced, by which there is cooperation with the community health association. In this way an additional supply has been obtained which is increasing slowly, though we have not taken advantage of the excellent method of advertising for women to supply breast milk. I hope those cities that have not such a supply will make provision for one, so that all babies who need breast milk can have it. There are many premature and feeble babies who, if they do not get breast milk, will have their chances of life diminished.

DR. CHAPIN: The Children's Welfare Federation has produced about 50,000 quarts of breast milk. It has started two new agencies, one at the Lebanon Hospital in the Bronx and the other at the Long Island Hospital in Brooklyn. Thus there are three distinct areas covered by the work, but this is not the time to go into the details. The nurses were paid 15 cents an ounce for the milk. There was a constant supply and anything over was sold at a reduced price. The well-to-do gave 25 cents an ounce, and we sold it to those who needed it. It has been a wonderful lesson to some as to the capacity of the human breast.

DR. ADAMS: I want to ask a question about these women. Is it necessary to watch the women? We furnished milk at 25 cents an ounce at first and kept the women in the hospital. Finally we let them go home and bring the milk to the hospital. We then found that one of the women was bringing cow's milk and selling it to us at 25 cents an ounce. Honest dairymen are rare and will furnish only pure milk when they cannot give us something else. It is likely that if you allow the wetnurse to go home her own baby gets the breast milk and the other baby gets what is left. The only way you can do if you allow the women to go home, is to have careful inspectors go into the homes and watch to see that they do not get cow's milk.

DR. NEFF: In order to utilize all breast milk which has been expressed from wetnurses and other donors where it is not possible to secure a Wassermann test, I have followed the practice of boiling such milk and have found that it agrees with premature infants as well as the unboiled milk. It can be used until such time as the infant is strong enough to nurse directly from the breast.

DR. HOOBLER (in closing): The only question is the one Dr. Adams asked. Most of these women have been on the bureau for several years. I know one who has been on the bureau for three years. We take no mother unless we are practically sure of her standing. She comes to the hospital for a long period of time at first. Later we permit her to express her milk before a nurse and the nurse goes around and collects up what is expressed. We hope soon to have an Abt machine and to have the women come to be stripped. It would be wrong to suspect all these mothers, besides, the milk is all poured together

so that if one mother attempts to put something over on us it would not injure the babies, but that could not happen, for our nurse has an eagle eye, and as well a regular analysis of the milk is made. If cow's milk is introduced it makes the protein jump to a high level. We have a nurse who looks over the milk, and if she finds milk that looks bluer than it should it is sent to the laboratory for analysis. We are constantly having the laboratory check up on the work. We do trust some of the old reliable nurses, and you would not suspect them if you knew them. At the same time we use every precaution.